

Dispositional Universals

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Abstract: The ontology developed in this article is a version of the bundle theory of universals. These universals are dispositional in nature. To possess a powerful character and to be empirically existent, these universals require a material substratum. This substratum is conceived as physical ether or Plato’s chora, in which universals are like waves in the sea. The world is composed of basic dispositional universals, such as charge, mass, and spin. These basic dispositional universals bundle together to form elementary particles, which in turn compose more complex structures. An object is thus a composition of basic dispositional universals, whose sustained unity is explained by their mutual dispositional manifestations. The assembled whole already exhibits different manifestations than its parts and therefore constitutes a new kind of dispositional universal of a higher order. Hence, a graded hierarchy is present in the structure of dispositional universals. The article defends the view that dispositions are universals rather than tropes, since what we observe in the physical world are identical, numerically repeatable properties, not merely similar particulars. The proposed theory of dispositional universals stands in opposition to Humean conceptions, as the thesis that “whatever is conceivable is metaphysically possible” does not hold. The lawfulness of the world is conditioned by the dispositional nature

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of universals. Scientific models that aim to explain and predict events should therefore be adapted to this metaphysical framework.

Keywords: Bundle theory; dispositions; kinds; laws of nature; universals.

1. Introduction

The world is made of stable objects; our bodies are held together; the dog in the garden is always barking; the neighbour's donkey has not begun smoking a pipe and talking about definite descriptions. Whether inside or outside our dwelling, we recognise objects, name them and know how these objects are manifested. We instinctively avoid a moving truck, and a dog will avoid it, too. Not only humans but animals, too, have the capability of predicting the behaviour of objects known to them when they are in contact with such and such circumstances or exhibit certain known states. The whole world seems to be ruled by order in the form of immutable laws. "Laws are supposed to be somehow the things that activate the world: the things that add the necessity and possibility to it and thereby make events happen" (Mumford 2004, 14). The world is made up of objects, and we classify these objects into kinds based on their common properties and give them names: dog, human, rock... The world is also governed by laws that we can also classify into kinds: laws of motion, laws of optics, laws of common sense... For example, Newton's law: $F=ma$, Snell's law: $\sin\theta_1 n_1 = \sin\theta_2 n_2$, common sense law: a stove burner that's glowing red is hot and will cause burns if touched. These laws apply equally throughout the world. My aim will be to explain how kinds of objects originate and what is the source of regularity in the world.

In this text, I argue that the world is composed of basic universals that are dispositional in nature; I refer to these as dispositional universals. The instantiation of universals as materially grounded entities presupposes the existence of a substratum, which I designate as ether, through which their dispositional capacities can manifest. The manifestation of these basic dispositional universals allows them to compose into stable objects. The stability of such bundles is made possible by the ethereal substratum in which the dispositional universals are instantiated.

Basic dispositional universals are structured into higher-level wholes, and their manifestation takes the form of a stable particular that belongs to a specific natural kind. The dispositional nature of these kinds of objects necessarily forces them to always manifest themselves under given circumstances in the same way, and to do so everywhere in the universe, at all times, and in all possible worlds in which these kinds would occur.

2. Laws of Nature

A central goal for science is to produce explanations from which it is capable of generating testable predictions (Douglas 2009, 445). One of the most basic models used to explain an event is the deductive-nomological (D-N) model of Hempel and Oppenheim (1948). The explanation takes the form of a deductive judgment: in the explanans are statements of antecedent conditions, C_1, C_2, \dots, C_k together with general laws L_1, L_2, \dots, L_k , and in the explanandum are descriptions of the empirical phenomenon to be explained E (Hempel and Oppenheim 1948, 138). If we know the premises (explanans), we are also able to deductively predict the empirical phenomenon in the form of a statement in conclusion (explanandum). The prediction is also a test of the truth of the statements contained in the premises of this model.

A law of nature can be expressed as a conditional “If F then G ,” or more specifically “Whenever F , then G ,” or “All F s are G s.” For example, “If the temperature of a gas increases while keeping the pressure constant, its volume will also increase”; “Whenever a current flows through a conductor, a magnetic field is produced around it” or “All metals are electrically conductive.”

It is necessary to note a point of interest, that mental ability, such as logical reasoning, serves us in D-N model for explaining and also predicting natural events. More than one philosophical dispute on the nature of the necessity of the world arose specifically due to this mixing of the *logical* with *natural* necessity. We can imagine that anything logically possible may be contained in the premises, and the form of judgment will guarantee correct logical deduction from them. By this mixing, physically unrelated facts can also appear in the D-N model: From the length of the shadow cast by the flagpole and the distance from the end of the shadow to the top of the flagpole, we will explain *why* the flagpole is so high using the Pythagorean

theorem. This is a mistake, because the shadow is not the cause of the size of the flagpole. For other examples, see (Bromberger, 1966).

In order to fix the strength of the connection between F and G and to avoid mere accidental generalisations, such as “All solid spheres of gold have a radius less than 1 km,” a counterfactual dependency must exist between them. As Lewis (2001, 2) puts it: “If it were the case that F , then it would be the case that G .” For a counterfactual statement in the laws of nature to be true, it should be connected to an empirical necessity. Laws should “express some sort of necessary connection between their antecedents and their consequents that is missing between the antecedent and the consequent of true but merely accidental generalisations” (Rosenberg and McShea 2008, 44). The cause F and the effect G should be ontologically necessarily connected.

When we say that there is a causal connection between two consecutive events, we mean that there is some kind of law connecting them, the earlier event being called the cause, and the later the effect. The question then arises as to what is the specific nature of the nexus between them. Is there any criterion permitting us to say that a given natural event is the effect of another? This question is as old as natural science itself... (Planck 1963, 44)

Philosophy offers several interpretations of the nature of nexus, as mentioned by physicist Planck. First, I will briefly introduce Humean theories. I will devote only minimal space to them, since they have already been extensively discussed in philosophical literature. I will then reject these theories, bypass many others, and focus exclusively on a specific non-humean theory of dispositional universals.

According to strict followers of Hume’s philosophy, the laws of nature supervene on constant conjunctions of events. In this view, the world is not governed by laws; the fact that we expect an effect to follow a cause is merely a habit of thought, not a manifestation of any natural necessity observable in the world. Since we do not perceive any necessary connection in nature, Hume concludes that cause and effect are distinct and separate events. The fact that specific causes have been followed by specific effects does not entail that this must always be the case in the future (Hume 1960, Part III, Section XIV). “Statements of laws, then, are merely descriptions

of the most significant regularities that happen to occur” (Hildebrand 2023, 2). This Humean model is, to me, deeply unintelligible. That metals have always expanded when heated, that stones have fallen from heights, that dogs have typically barked, that human beings have philosophised throughout human history, that the Taj Mahal has held together in the same place—are all these regularities and persistent stability merely the products of accident? I would be afraid to lie down in my bed, for it might turn into an abyss at any moment.

Humean supervenience “is the doctrine that all there is to the world is a vast mosaic of local matters of particular facts, just one little thing and then another” (Lewis 1986a, ix). According to Lewis’s modal realism, possible worlds with their own Humean regularities over which the laws of nature supervene do physically exist. In his view, two theses apply: (1) absolutely every way that a world could possibly be is a way that some world is, and (2) absolutely every way that a part of a world could possibly be is a way that some part of some world is (Lewis 1986b, 86). This conception acknowledges that there are also worlds in which metals do not conduct electricity, salts do not dissolve in water and jellyfish in the sea have DNA like B. Russell had in our world. As for our current world, well Lewis (2001, 73) restates Ramsey’s theory of lawhood: a contingent generalization is a law of nature if and only if it appears as a theorem (or axiom) in each of the true deductive systems that achieves a best combination of simplicity and strength.

In these Lewisian-Humean worlds, no ontologically separate laws of nature or necessary connections exist; the world is contingently regular for some mysterious reason; nothing supports this regularity, and therefore it makes no sense to speak of some natural necessity. An account of what grounds regularity, in the form of laws of nature, appears in the influential theory of Dretske (1977), Tooley (1977) and Armstrong (1989). A law of nature is second-order universal N that connects first-order universals, F and G . This relation is denoted as $N(F,G)$. According to Armstrong (1985, 85) the relation $N(F,G) \rightarrow \forall x (Fx \rightarrow Gx)$ applies, which means that Humean regularity is derived from the law of nature, not the other way around. “This non-logical necessitation [N] entails a constant conjunction at the level of first-order particulars (with reservations still to be made), but the constant conjunction does not entail the necessitation” (Armstrong 1978, 90).

Here, the law of nature N, which necessitates the regularity of world, is dominant. According to Armstrong's combinatorial theory of possibility, as many possible worlds are conceivable as there are conceivable combinations of universals among themselves and thus also combinations of various laws of nature. For this reason, Armstrong talks about the so-called weak necessity, because the content of this necessity differs from world to world, depending on the laws instantiated there. Armstrong is an advocate of universals *in re*, and these need not be instantiated now because the past, present, future are equally real (Armstrong 1985, 82).

Armstrong's universals are inactive categorical properties that are connected through contingent necessity. Therefore, possible worlds in which donkeys talk exist, because the law of nature allows them to. It is possible to combine the universal of donkeyness with some universal including the possibility of talking, and thereby we get the possibility of a talking donkey. D. M. Armstrong says that here is a strong reason to think that a talking donkey is possible (Armstrong 1989, 101–102). A glass vase is breakable because certain circumstance obtain the categorical arrangement of the glass F together with the law of nature N will allow the vase to break G. The general problem of this theory is how N is able to act on the universals F and G. How can something act or connect when all properties are passive and powerless?

Even if the laws of nature were some Platonic non-spacetime entities, it is very problematic to explain how it is possible that they can act on passive matter and dictate what it should do (cf. Mumford 2004). The same problem arose in Descartes's dualism, which the 17th century occasionalists explained by means of divine action. God desires (F,G), therefore (F,G) will happen. The world's existence is dependent on God's will. God ceases to will and the world ceases to exist; no bodies have the power in themselves to move by themselves; God alone is the essential cause of their motion (Malebranche 1997, Book Six). In the occasionalist world, God somehow miraculously moves passive objects or re-creates the world (Ott 2009, 71) based on his own will. He is the cause of objects behaving lawfully, and he can also decide to perform a miracle and violate customary regularities of the world (e.g. the case of the Eucharist).

All these scenarios of the world, in which the laws of nature somehow enter into world events, are very complicated, inconceivable. For example,

every time an electron meets a positron, the invisible delicate fingers of God appear in the form of the law of nature, and they send these two elementary particles into a state of annihilation. God's hands constantly hold us to the Earth so that we do not fly off into space. These divine hands create Descartes (1996, 33–34) anew with every moment. Perhaps, this divine power stood before the creation of one of the best possible worlds, and the regularity is formed of pre-established harmony; the world is set up as a great mechanism with inactive monads (Leibniz 1985; 1989). Or, as I will further argue in this text, this power is contained within the objects themselves, or more precisely, objects are shaped by force properties—dispositional universals. These universals are of a modal character, and the entire universe may be reflected in them as in monads; but unlike Leibniz's monads, these are causally active thanks to ethereal physical substratum.

3. General Characteristics of Disposition Properties

The word disposition has a Latin origin *dispositio* and its Greek equivalent is *diathesis*. Disposition means something like “orderly arrangement” (Jansen 2009, 24). We can also think of disposition as dynamis (Aristotle's term), power (Locke's term), ability, potency, capability, tendency, potentiality, proclivity, capacity and so forth (Choi and Fara, 2021). Dispositions have a *directedness*, that is a power for, or to, some outcome (Molnar 2006, 57).

A disposition is some internal property of an object which is manifested under a given stimulus, always necessarily in the same way in all possible worlds. Always when we immerse salt in water with *ceteris paribus* conditions (no blockers such as finks¹ or antidotes² are present), the salt dissolves. It would dissolve wherever the same or similar conditions were present, because dissolving in water under the given conditions is an essential property of salt. Bird (2007, 60) tells us we can capture the definition of a disposition's manifestation through the conditional: $\forall x (ceteris\ paribus ((Dx \ \& \ Sx) \rightarrow Mx))$, where D is the disposition, S is a stimulus and M the manifestation.

¹ The term was coined by C. B. Martin (1994).

² The term was coined by A. Bird (1998).

If we were to agree with Humean metaphysics, then it is not necessary truth that salt will dissolve under the given conditions, because it is conceivable that it would not dissolve. In the context of dispositional theories, however, it is true that every object which has basic chemical structure NaCl must inevitably dissolve under the given conditions; if this were not the case, then we do not have an NaCl object in front of us, but something else similar to it. Likewise, if something is H₂O it must also manifest itself as H₂O; even if there were a liquid XYZ (Putnam 1973) very similar to water on Earth, it could no longer be water as we understand it, but another substance. According to B. Ellis (2001, 48), in scientific essentialism there are genuine causal powers, capacities and propensities which exist in nature as universals, and therefore they are the same in all possible worlds. In my concept of dispositional universals, H₂O should be a complex universal that, when instantiated in any possible world, must always manifest as being watery under the same conditions. H₂O in one world and H₂O in another world are numerically different but qualitatively identical. H₂O and XYZ are both numerically and qualitatively different; therefore, the identity relation cannot apply between them.

4. Tropes or Universals

The medieval dispute between nominalism and realism endures even into the present. The importance of this topic lies in the fact that if universals do not exist, then our descriptions of nature and our generalizations are mere fiction. Knowledge of nature cannot exist, because in a world where no two properties are identical, our employed vocabularies and laws cannot refer to individual entities.

Proponents of the existence of dispositional properties or powers are also nominalists (Heil 2003), (Molnar 2006), (Martin 2008), and realists (Mumford 1998; 2004), (Ellis 2001), (Bird 2007), (Tugby 2013). I advocate the position of the bundle theory of dispositional universalism. My version, however, is a moderate form of the bundle theory of universals, because for universals to become materialized and active, they must have a substrate – some kind of sea in which waves are realized, like Plato's *chora* (χώρα) in the *Timaeus*, or an ether as in physics.

Proponents of tropes say there are such things as attributes, but they deny that attributes are multiply exemplifiable entities. According to this form of nominalism, it is impossible for numerically distinct things to have numerically one and the same attribute. No two particulars share a single attribute. There is always a difference between numerically different particulars, however slight, in shade of colour, in shape, in size, in weight, and so on (Loux 2006, 72). Particulars, such as tropes, unlike universals, can never be qualitatively identical but only similar. “Tropes are *particularized properties*” (Ehring 1997, 11). According to Ehring, tropes are not necessarily momentary; there are also persisting tropes. The redness of the apple (endurantistically) persists over time. Not all tropes persist in time, however; some are momentary entities, like the blue of a movie-image sky (Ehring 1997, 14). The position of nominalists is rather strong in the case of complex macro-objects. When we look at one Chihuahua and another, we see the likenesses, not the sameness. Chihuahuas can vary in the arrangement of their fur, their shade, their character, etc. The word “Chihuahua” refers only to particulars whose characteristics they resemble. Today, biologists particularly struggle with defining species and determining whether they exist as real ontological entities.

Universals usually mean *properties, kinds, relations*. They are repeatable entities. Table salt *here* and table salt *there* share an identical chemical structure, colour and taste; they fall into a kind of table salt, and when they are in relation with water under the same conditions, *ceteris paribus*, they manifest identically by dissolving. According to Plato’s realism *ante re*, not all universals must be instantiated somewhere; universals are non-spatio-temporal entities, while Aristotle’s realism *in re* only admits the existence of instantiated universals. Plato embraces a “two-worlds” ontology; his “universals are ontological ‘free floaters’ with existence conditions that are independent of the concrete worlds of space and time” (Loux 2006, 41).

The position of the bundle of universals seems to be ontologically economical, without the need for an ontologically obscure substance as the bearer of properties. Objects without substance are bundles of universals. Objects are identical to bundles of *immanent universals* (Lafrance 2015, 202). According to Lafrance, for universals to be immanent, they need to be in fact instantiated by a region of space (Lafrance 2015, 203). “Universals

distributed over space are grouped, or bundled up, together. ...A blue cube is identical to the bundle containing *blueness*, *cubic* and some other universals of *mass*, of *rigidity*, etc” (Lafrance 2015, 203–204). In the bundle theory in general, the problem is to explain how the “co-instantiation” of universals holds the bundle together. Some also call this relationship of the relation of the bundle “compresence,” “collocation,” “combination,” “consubstantiation” and “coactuality” (Loux 2006, 91); this relation is generally considered to be primitive and undefinable. It is also a problem to explain why incompatible universals, such as squareness and roundness, do not occur in a mutual bundle (Lafrance 2015, 213–214). If universals should be powerless, then it should be possible to think about the “fusion” of everything with everything else. My proposal of dispositional universals can resolve these mentioned problems. Before we present them in more detail, I would still answer the question why dispositional universals and not dispositional tropes.

In the case of the existence of macro-objects, it is obviously less problematic to claim that the world is made up of tropes. In the biological world, species are developed by means of evolution, and on the basis of genetic mutations it is impossible to talk about identical characteristics of descendants with ancestors. It should be remembered, however, that all macro-objects are composed of basic units and theses are already qualitatively identical.

Let’s take a look into the world of elementary particles based on the empirical findings of science. The fundamental electron particle, labelled as e^- , has the basic properties: charge -1, mass 0.5109989461(31) MeV, spin $\frac{1}{2}$. If some other particle has some of the same properties as an electron but differs in its mass, the value of which is 105.6583745(24) MeV, then it is already another object, which in science is called a muon, denoted as μ^- .³

³ It must be admitted, however, that the values in brackets (31) and (24) express measurement errors; the uncertainty has a value of \pm expressed in the appropriate decimal place where the bracket is located. There must always be errors in measurement, but I consider these errors to be external effects working on objects that are not relevant in classifying them into kinds. For more details on measuring the mass of electrons see the more technically demanding article (Sturm and Köhler and Zatorski, et al. 2014); the authors from the Max Planck Institute for Nuclear Physics in Heidelberg used the Penning trap, a homogeneous magnetic field. The very precise

If we come across objects with the same charge, mass and spin properties, we always call each such object an electron. If it already had a different charge, or spin or mass, it can no longer be an electron, but something else. It is an essential property of electrons that they have the charge, mass, spin and other properties that are characteristic of all electrons.

Why do electrons exist in the world? Because there are basic universals that form them. If possible worlds existed and in them all the particles that we had become familiar with and which would have those same properties and only those as our electrons and would behave like electrons, then we could declare that electrons also exist in these worlds. In all possible worlds, these objects, under the given circumstances, *ceteris paribus*, behave the same.

When a scientist measures particle 1, which has charge of -1, a mass of 0.5109989461 MeV and spin of $\frac{1}{2}$, and again manages to measure the occurrence of another particle 2, which has a charge of -1, a mass of 0.5109989461 MeV and a spin of $\frac{1}{2}$, he declares that in both cases he measured properties indicative of an electron. What is the difference between the first measured particle e^{-1} and the second measured particle e^{-2} ? A tropist would say that we have two very similar objects before us, which we call by the common name of electron. A realist would say that we have before us two qualitatively identical objects. We can decide which statement is more philosophically correct by comparing the properties of both numerically different objects e^{-1} and e^{-2} .

$$\begin{array}{c} e^{-1} \times e^{-2} \\ -1 \times -1 \\ 0.5109989461 \text{ MeV} \times 0.5109989461 \text{ MeV} \\ \frac{1}{2} \times \frac{1}{2} \end{array}$$

We have expressed the properties of both measured particles numerically. A tropist would say that the property of 0.5109989461 MeV of particle e^{-1} is only very similar to the 0.5109989461 MeV property of particle e^{-2} . But

resulting value of the mass of the electron in units of the ion's mass (Sturm and Köhler and Zatorski, et al. 2014, 469) is $m_e = 0.000548579909067(14)(9)(2)$. Charge, spin and mass should be regarded as intrinsic, non-relational properties of microscopic particles (Dorato 2006, 144).

I do not see any similarity here, but sameness! Therefore, in the world of elementary particles, realism establishing universals that science can also express numerically holds the upper hand.

5. Chora or the Physical Ether as the Bearer of Bundles

I think that bundle theories of universals have a fundamental problem explaining the *immanence* of universals themselves. If there were only universals without their instantiation, there could not be numerically multiple objects with the same properties—at most, there would be only one exemplar of each kind in a single Platonic heaven. There could be no “here” or “there.” For instance, Lafrance (2015) postulated a space in which universals are instantiated and their numerical distinctness is secured by spatio-temporal coordinates (cf. Hawthorne and Sider, 2002). I cannot identify with such projects, since they may lead to idealism or, at best, have only a phenomenological status. In the conception of dispositional universals, an energetic source is required to enable the manifestation of the universals’ own potentials; at the same time, it assigns them identity, differentiates them from one another, and grants them existence.

In order for one universal to act upon another, it requires a source of energy, which may be the all-pervading ether. A notion very close to what is needed here was considered by Plato in the *Timaeus*, namely the concept of *chora* (χώρα), understood as a receptacle capable of receiving forms. To explain what existed before the generation of the world, Plato posits a threefold distinction: “We may indeed use the metaphor of birth and compare the receptacle to the mother, the model to the father, and what they produce between them to their offspring...” (*Timaeus* 50d). The concept of *chora* is notoriously difficult to translate, as the word has no meaning; it is, as Sallis (1999, 115) puts it, “intrinsically untranslatable.” Based on interpretations of Plato’s text, and for the purposes of this text, we may accept that *chora* is “both space and matter all at once” (Zeyl 2010, 118); see also Jelinek (2015, 13, 22), Sallis (1999, 153), and Zeyl and Sattler (2023, chap. 6). The reasons for this spatio-material unity of the receptacle are two:

First, we think that spatio-temporal particulars must be made up of *something*. They cannot be mere constellation of properties, mysteriously bundled together and even more mysteriously capable of maintaining that bundling as they move through space. And they cannot be made up of space, if space is sheer emptiness. (Zeyl 2010, 118)

Chora is formless and without properties, because it receives forms, just as manufactures of scents prepare the liquid to be as odourless as possible so the scent stands out, and those making impressions smooth the surface to clearly receive the imprint. (*Timaeus* 50e–51a). We shall not be wrong if we describe chora “as invisible and formless, all-embracing, possessed in a most puzzling way of intelligibility, yet very hard to grasp” (*Timaeus* 51a-b). Chora is filled with forces that exist in a state of disequilibrium; it is a kind of necessity, but a disordered one. “It is rather a necessity that would operate outside the law... resisting the rule of $\nu\omicron\upsilon\varsigma$ even if responsive to its persuasion. This necessity is also called the *errant* form of cause” (Sallis 1999, 92).

The pre-elemental qualities of *chora*—water, fire, earth, and air—shake *chora* itself, and in turn, *chora* shakes them,

with the result that they came to occupy different regions of space even before they were arranged into an ordered universe. Before that time they were all without proportion or measure; fire, water, earth and air bore some traces of their proper nature, but were in the disorganized state to be expected of anything which god has not touched, and his first step when he set about reducing them to order was to give them a definite pattern of shape and number (*Timaeus* 53a–b).

In this way, the Demiurge gave the world its order, but with the qualification that a certain degree of imbalance remains present within the cosmos. He brings about a state of near-uniformity, because susceptibility to agitation remains within the unalterable aspect of necessity ($\acute{\alpha}\nu\acute{\alpha}\gamma\kappa\eta$), which can be persuaded to serve the ends of intellect ($\nu\omicron\upsilon\varsigma$) (Zeyl 2010, 126).

Zeyl (2010, 122) conceives of chora as analogous to the sea, understanding it as both matter and space. We should imagine the pre-elements as waves in the ocean. Water is the material substratum, and the waves are

spatial particulars. What differentiates one wave from another is its location in space and time, as well as its physical configuration (cf. Jelinek 2015, 23).

The entire model of chora proves to be highly useful for a bundle theory of universals. Universals may be instantiated in the underlying matter, which is chora. Universals are like waves: merging, colliding, or cancelling one another out. All particulars are waves of the sea. Particulars are thus bundles of universals that mutually interact thanks to a shared substratum of which all such bundles are a part. When the material of an object is exchanged or transferred into another, the identity of either object need not change, what is relevant is the form, the stability of the bundle.

Perhaps a more modern name for this matter, Plato's chora, could be found in the *ether* of the physicists. The concept of ether has undergone several centuries of development; in the twentieth century, it was even discredited by the experiments of Michelson and Morley, but it is today reemerging. The *ether* was proposed by Aristotle in his model of the supralunar world as a fifth element, considered to be pure, unchangeable, imperishable, and unfathomable. This model persisted until the seventeenth century, when a mechanistic image of the world replaced it. In the Cartesian worldview, the motion of bodies no longer depended on their intrinsic nature, but on a subtle matter that mediated the action of one body upon another (de Andrade, Faber and Rosa 2013, 560, 562).

Newton even speculated that his occult force of gravity is, in fact, a most subtle Spirit diffused throughout space (Newton 1846, 507), which would explain action at a distance. Later, Faraday employed the concept of ether in his theories; according to him, all space was filled with lines of force, and the atoms of matter were conceived as centers of force. Maxwell's ether was the indispensable medium for describing the phenomena of electromagnetic theory, including the wave propagation of light (de Andrade, Faber, and Rosa 2013, 560, 562).

The situation changed with the advent of special relativity, although with general relativity, substantialist tendencies re-emerged to restore a role for ether, now in the form of space-time acting on the distribution of matter. The revival of the concept of ether as *plenum* is evident in quantum mechanics, under notions such as quantum vacuum or dark energy. It has been

recognised that “the concept of ether is making a strong comeback in physics” (de Andrade, Faber, and Rosa 2013, 573).

Speculation may arise as to how to define *ether* precisely. Is it an atomless *gunk*, that is, a substance infinitely divisible into ever smaller parts? (cf. Lewis 1991, 20; Sider 1993, 286). Neither logically nor empirically is such a possibility excluded; discrete quanta at the value of Planck’s constant may depend on form, while the matter composing them may be infinitely indivisible.

The exact nature of the matter in which the entire scenography of the world unfolds may be unknown to us. And yet, as in the case of chora or ether, it may hold that the substratum itself cannot be defined precisely because it is formless.

6. Dispositional Universals–Basics Premises

I postulate a basic axiom from which an entire proposed metaphysical model of the world will be based:

- 1) The world is made up of basic dispositional universals.

What are basic dispositional universals? From a philosophical point of view, I can only say that *some*. From a scientific point of view, these are basic properties, such as charge, mass and spin. Independent new particulars, such as fundamental particles quarks, leptons and bosons, are assembled from these universals. More complex elements are assembled from these, i.e., mesons and baryons are assembled from quarks. By combining a proton, a neutron and an electron hydrogen is created. By combining more protons, neutrons and electrons, the other elements in the periodic table are formed. All elements are already more complex universals with specific properties. How is it possible that by combining basic universals a new object is formed?

Basic universals are dispositional in character; therefore, I propose calling them dispositional universals. Universals themselves are potencies, and power gives them ether, as I claimed in section 5. So, the universal and ether together give rise to a dispositional universal. In dispositional universalism, the dispositional universal is manifested under suitable stimuli; if

one hydrogen H meets another H (in the presence of a given energy, distance and angular motion), both have the ability to bind to one another; they are stimuli for each other, and a stable H₂ molecule arises, with its stability ensured by the mutual manifestation of both Hs. This bundle holds together because it is bound by its very dispositional nature. This solves the problem of co-instantiation of bundle theory. An object is a bundle of basic dispositional universals, which by their manifestations already form a new dispositional universal of a higher order.

We can now formulate another thesis:

- 2) Basic dispositional universals are connected into bundles and thus create new objects through their mutual manifestations.

Complex elements can in turn connect into even more complex structures, such as when H₂ combines with oxygen O and together they manifest a new stable bundle of H₂O. Physics textbooks describe how elementary particles hold such a bundle together with their energetic bonds. For example, Ingthorsson, in his powerful particulars view of causation, postulates *interaction* as a fundamental relational component between particulars. All interactions occur between the constituent parts of objects and serve as the glue that binds those parts together into a unity. There are four fundamental types of interaction—the same as those identified by physics: strong, weak, electromagnetic, and gravitational. Differences in the strength of these interactions allow us to distinguish between different physical systems, each displaying a different kind of unity depending on the interactions by which it is constituted (Ingthorsson 2021, 103–105).

We are, of course still moving in the area of science, and this may turn out to be wrong in time. Therefore, to state that these exactly are the basic universals and these are their combinations is only an empirical fact. From a philosophical point of view, the concept of dispositional universals is interesting for us, as it solves many problems of philosophy. How many kinds of basic dispositional universals exist cannot be answered exactly; we can only stick to the postulates of science and its incidental findings.

Some findings of science about the ontological nature of fundamental particles and their dispositional manifestations may be controversial or difficult to explain, for example, due to their indeterministic character, complementary dualism, quantum entanglement. The biggest stumbling block

of science is the inability to connect the micro world (the quantum world) with the macro world (Newton-Einstein world).

- 3) Dispositional universals of a higher order are manifested in different behaviours than the dispositional universals of a lower order from which they are composed.

The bundles from which objects are assembled are mereological sums of parts and they are in fact an entirely new wholes. If 3) were false, then it would commonly happen that we could pass with our bodies through walls from one room to another. An elementary particle is able to tunnel through a barrier, but the entire object composed of these particles cannot, or it is highly unlikely.

The whole is thus more than the sum of its parts. A bundle of dispositional universals forms a new substance whose parts are dependent on the whole and the whole on the parts. A liver cannot exist without an organism, just as the organism cannot exist without the liver. The whole is held together by its necessary dispositional universals, which may be joined by accidental dispositional universals. A universal is necessary only for the given context of the whole. The liver is a necessary component of the whole; tooth decay is its accidental addition. The border between necessary and accidental universals is not always clear. Eye colour can be an accidental property, but it is causally determined by the DNA chain. At the same time, it applies that a person would be a person even without a specific eye colour, but without their fully functioning development we are already thinking about a defect and not a fully developed human nature.

Wholes often manifest differently than their parts. When we move a chair, we are moving the entire inertial frame of reference in which the electrons continue to rotate around their nuclei. The level of interconnection of parts in the whole can be graded, from simpler connections to stronger bonds. The piling up of snow on a roof can be the first example. One flake joins another, and together they form an increasingly heavy mass, until finally the roof collapses. The second example can be a person, whose parts create an interconnected organic unity.

Transitions from the microworld, through molecules, objects, living creatures, communities, planets, galaxies and universe/s, lead to various leaps.

At the lowest levels, the world can run continuously⁴ but between different levels we can see jumps. A new snowflake that falls on a roof will cause a jump from the standard appearance of a persistent roof to its collapse. The emergence of new qualities can be compared analogously to the weather; they are governed by synergistic processes, attractors; air flow jumps to a new level into a new object, a tornado. Likewise, a husband in a household shows standard care expressions, but he comes to the crowd and is overcome by crowd psychosis and now shows aggressive manifestations determined by the whole—the crowd.

- 4) Anything cannot be connected to anything.

Wholes cannot be assembled from arbitrary universals—this is the problem that troubles the bundle theory of powerless universals. It is not possible, for example, for a triangular universal to connect with a quadrilateral universal, just as it is equally not possible, *ceteris paribus*, for the two negative poles of a magnet to be non-forcefully connected, or for a person with damaged speech organs, *ceteris paribus*, to have the ability to recite *The Iliad* aloud. In the ontology of dispositional universals connections between universals are constrained by their potencies and mutual stimulus conditions.

- 5) Anything cannot be manifested in any way (What is logically conceivable is not always metaphysically possible).

It is not metaphysically possible for a donkey's DNA to manifest itself through human speech. Or that a possible world exists in which Bertrand Russell is a stupid jellyfish, or salts do not normally dissolve in water. Dispositional universals are manifested under suitable stimuli, always necessarily the same, *ceteris paribus*, in all possible worlds. Why this is so is an empirical problem. At least on an inductive level, we find out how given kinds of objects are manifested under given circumstances, but *why* it is in their nature to manifest in this way is a more demanding question.

- 6) Objects appear to us through their manifestations of dispositional universals, and we define them on the basis of these manifestations.

⁴ According to science, in reality discretely delimited by Planck's constant.

Objects appear to us through their dispositional manifestations. A blue surface reflects light with a wavelength in the range of 450 nm to 495 nm. The same identity relationship holds between blueness and wavelength as between water and H₂O.⁵ When someone perceives blue at a wavelength of 450 nm and someone else perceives a colour at a wavelength of 450 nm, we can say that they are both perceiving the same manifestation of blueness. A wave that spreads from the surface of the object is this universal, and the surface of the object is dispositionally arranged to reflect light of this wavelength. Two surfaces that emit an identical wavelength exemplify the same universal, blueness – which is the ability of elementary particles occurring on the surface to absorb and then emit photons of the given wavelength. The wave is available to be manifested as a sensation upon stimulation with the perceiver’s eyes and mind.

We identify objects on the basis of their manifestations; we classify them into kinds and create concepts and definitions about them. At the same time, the necessary properties of objects should be captured in the definitions. Gold, an object with a proton number of 79, always manifests the same under given circumstances (Kripke 1980), and its specificity is, for example, malleability and solubility in aqua regia. It is chemically stable and therefore does not oxidize or corrode under normal conditions. And so on. The semantics of words is created based on dispositional manifestations of the kinds of objects that are represented by symbols in our vocabulary.

An object isolated from any interactions with the world does not make itself known; the world is therefore an interconnected set of interactions that trigger each other’s dispositions. “The world is a single whole, composed of properties whose essence and identity are determined by their place in that whole” (Mumford 2004, 184). A property is to be nothing more than a set of connections to, and causal powers for, other properties (Mumford 2004, 185).

If, for example, gold occurred in another universe where there were alien universals, then when in contact with these alien universals, it could show alien manifestations, and we would devise other definitions about it. Even in our world, everything does not have to interact with everything; therefore, we may not have recognised all the manifestations of known kinds, or

⁵ On the relation of identity, see (Kripke 1971).

these manifestations have not yet been identified for us. More than once, science has come up with new kinds of manifestations; for example, the discovery of electric power, the power obtained by splitting the atom, the collapse of massive objects into the form of black holes, and others.

7) Dispositional universals are modal in nature.

Point 7) is limited by point 5). But this is the greatest mysticism of dispositional universals and dispositional theories in general. I rejected the laws of nature as ideal entities, “free floaters,” because according to dispositional theories, the world is governed by the very nature of the properties of matter. This is why the regularities must be sought in dispositional universals, from the most basic up to organised new units. An object in itself contains the possibilities⁶ of how it would necessary manifest itself under the given circumstances and these possibilities are within it, and we can think of them as records on a strip of film. The stimulus illuminates the given image and it then manifests in the form of force action. Sometimes the manifestation means the expiry of the object, like the manifestation of the breakability of a vase—the mutual energy bonds of the object’s properties are released and it disintegrates—and sometimes the manifestation persists permanently, as the gravitational force of a star.

Where these modalities are located is a debatable question. We can sense brownness, firmness or the curved silhouette of a vase, but not its breakability. In this case, sensory experience is insufficient; we have contact only with the manifestations of objects and not with the capabilities that are in the potential of their realisation. For this reason, when examining the world, we must help ourselves with rational experience; this means, we infer the existence of potencies in particulars belonging to the same kinds from empirical experience with the manifestations of given kinds of objects. Belief in the validity of our predictions is possible because the given objects fall into the given kinds, and for each kind, such and such manifestations are characteristic under the given stimuli. The heating of a wax form can take on almost infinite possibilities of its geometric arrangement, and all these

⁶ B. Vetter prefers the term potentiality, they are “possibilities rooted in objects; they are like possibilities, but they are properties of individual objects” (Vetter 2015, 3).

possibilities must be contained in the entire wax. If no suitable stimuli are present for manifestation, then these manifestations slumber in objects as unrealised possibilities. Their manifestations depend on the possible arrangements of each property in relation to others, and these possible arrangements must be included in a disposition as its necessary reactions to those possible stimuli. Empirical manifestations of objects are dependent on the evolution of the entire universe; therefore, the universe is also reflected in them, as in Leibniz's monads, and not only the universe, but also all metaphysically possible configurations of metaphysically possible worlds. The movement of a comet is dependent on the overall structure of the universe and its past; this comet could show different manifestations, if it were found in different conditions—in different worlds.

Potential manifestations of dispositions are not merely something exclusively in us that we attribute to objects; they are natural properties in nature. Therefore, there is a difference here between the logical and metaphysical possibility. But what is logically possible does not have to be metaphysical. The world is ruled by *de re* necessity. All the possibilities of how the world can be metaphysically are reflected in objects, because each object manifests itself in a specific way with every other object, and these manifestations are within its potential. The possibilities of development of the world are limited by the possibilities of manifestations from mutual interactions of the dispositional universals it contains. If parallel universes existed and were to intermingle, we could recognise new manifestations of familiar objects. If everything comes from one Multiverse and is of one essence, then there should be here the possibility for mutual interaction of all objects within their permissible metaphysical possibilities. These unrealised possibilities should be real existing forces that are part of dispositional universals. For us, they are almost mystical entities, because their number of manifestations can reach enormous dimensions.

Where these unrealised possibilities are located is still a great mystery of philosophers of dispositional properties. How can something exist when it is not current? Where is the explosiveness of the grenade located when the grenade has not yet exploded? Answering this question is very difficult, but in this case, universalists have an advantage over tropists. Platonic realism offers a robust solution to the problem of unmanifested dispositions

by grounding dispositional directedness in a relation between abstract universals that exist independently of any instantiation. “There can be such a relation because the manifestation universal can still exist even if the particular’s disposition never actually manifests” (Tugby 2013, 461). In contrast, Aristotelian immanent realism requires that the manifestation universal be instantiated somewhere in space and time in order to secure directedness. Thus, while Platonism appeals to the pure existence of universals, Aristotelianism ties them to actual or possible occurrences within the concrete world (Tugby 2013, 461).⁷

In quantum physics, the wave function ψ is the carrier of mutually exclusive states: the decay or non-decay of uranium. According to Everett’s (1957) concept of quantum physics, the many worlds interpretation, different realisations of ψ split into parallel branches. For the eigenfunction of observation ϕ^{S_1} corresponds to the state where uranium has not decayed, and ϕ^{S_2} corresponds to the state where uranium has decayed. However, from the viewpoint of the Multiverse, this process still represents one universal of uranium, in which all branching states are included. Ultimately, this is not about ontological potencies in the traditional sense, because all possible outcomes of the wave function are realised in separate branches of the Multiverse.

Everett’s concept of split worlds also brings several philosophical problems:

Does the pointer itself split in two? Or are there two numerically distinct pointers? If the whole universe splits into two, doesn’t this wildly violate conservation laws? There is now twice as much energy and momentum in the universe than there was just before the measurement. How plausible is it to say that the entire universe splits? (Ney 2013, 33).

Therefore, we do not have to think about split worlds, but about the *parallel* course of physical worlds in which all metaphysically possible states are realised. These worlds may be patterns in the one universal quantum state that emerge as the result of its evolution; distinct components of the quantum state come to evolve independently of one another (Ney 2013, 34).

⁷ Tugby (2013) argues only in favour of Platonism. He could explain his theory by refusing to answer “the much-discussed question of how to understand the relationship between universals and their concrete instantiations” (Tugby 2013, 452).

Appealing to possible worlds is only an aid in the era of still prevailing logical positivism, in which we need truth-makers even for propositions about unrealised possibilities of dispositions. I am rather an advocate of the assumption that dispositional universals are an unexplored dynamic mechanism full of potentialities, whose empirical immediate dimension escapes us. We know from inductive experience that possibilities exist in some form. From the manifestations of the given kinds of objects (“These metals expanded with heat”) we rationally ascribe possible manifestations to the same kinds (“This is a metal and will also expand with heat, because all metals have the ability to expand when heat is applied”).

Dispositional universals may also be “metaphysical algorithms” whose outputs depend on the inputs. Similar to an electronic calculator that does not need to contain all combinations of states, it only needs the function ($_ + _ = _$) into which values are filled in, nor do dispositional universals need to contain the information that S. Mumford is possibly married to N. Cartwright. It is sufficient that S. Mumford’s metaphysical algorithm allows him to do so. Just as a calculator is able to calculate $18325 + 12365$, so, too, might S. Mumford be able to marry N. Cartwright, if the right (and even advantageous) circumstances arise. The calculator does not endlessly count somewhere in the range of $18325 + 12365$, and S. Mumford does not keep saying “Yes!” to N. Cartwright. Dispositional universals are forms that shape the world according to current inputs of another dispositional universals on the basis of what they are capable of by their construction.

8) Kinds exist at all levels of arrangement of dispositional universals.

From the basic kinds of universals, larger units, such as particles, atoms, molecules, proteins, plants, viruses, bacteria, insects, animals, people, society... are assembled. We would find common universals at every level. Common universals that characterise people are, for example, the command of language–grammar, logical concepts (and, or, not, greater/lesser, part/whole...), expression of emotions (smiles, frowns), music, dances, child-care of mothers, incest avoidance (Brown 2004, 48–51).⁸ But the more we move to more complex levels of arrangements, the number of kinds grows and our

⁸ In my article (Károly 2024), I proposed a method for detecting features of human nature based on discomfort.

classification of particulars into kinds also becomes more complicated – complications are caused not only by the cladistic tree in the animal kingdom, but also by determining which properties are considered essential and why specifically these. We cannot deal with the problems faced by biologists in this text. I can only summarise the whole problem by saying that all objects are made up of kinds of lower levels, which in a bundle create a new particular and a new kind. Common universals of lower levels characterise kinds at a higher level; for example, the dispositional universal the ability to learn human speech occurs in all healthy individuals, the whole of which we call humanity.

- 9) If world events are conditioned by dispositional universals, then laws of nature do not exist.

The implication in 9) would be true even if the antecedent were false. The traditional humeans reached the same conclusion (world events are not conditioned by anything), as did the tropists (world events are conditioned by dispositional tropes). Non-humean philosophers who claim that laws of nature do not exist are, for example, Martin (2008), Mumford (1998; 2004), Bird (2007) and Ellis (2001). The tropist Martin claims that laws of nature appear to be ontologically otiose, because “If you accept arguments for a realism of dispositions and their reciprocal disposition partners and grand the dispositions could be fully actual although their partnerings or manifestations might not be, then *what* is the need for universal law?” (Martin 2008, 22). According to Mumford, an advocate of universals: “If necessity resides in the propertied particulars in nature, there will be no need for laws. Particulars are powerful in virtue of their properties. They are not powerless discrete units so do not require laws to make them act. Immanent necessity in nature might then become a good reason why there are no laws of nature” (Mumford 2004, 63).

Point 1), from which I gradually formulated theses 2) – 8), can be reformulated into a statement that is the main statement of dispositional universalism:

- 10) World events are conditioned by dispositional universals.

Then from 9) and 10) we get the final conclusion:

11) Laws of nature do not exist.

Of course, this is not a new conclusion; it is a universal claim among dispositionalists. What is new is my proposed ontology of dispositional universals and their basic behaviour, as outlined in the ten premises.

7. Statements about the Lawfulness of Dispositional Universals in the D-N Model

What effect do statements 10) and 11) have on the D-N model we mentioned in the introduction? Hempel says that dispositional explanations do conform to the covering-law conception of explanation. Disposition is a property dealt with by a theory, and explanatory principle is part of what the theory asserts about disposition and, as general theoretical principle, it expresses a nomic claim (Hempel 1974, 374).

Statements in dispositional universalism about manifestations of dispositions have a nomic character. The statement about a particular⁹ “If someone strikes this breakable glass vase, *ceteris paribus*¹⁰, then this vase will break” is valid because this particular is represented by the kind to which all the breakable glass vases that were, are, will be and could be belong. If a specific kind of breakable vase is mass-produced in a production line, it is enough to break just one with a hammer, and we can conclude for all these products: “For every breakable glass vase of this kind, if someone hits it with a hammer, *ceteris paribus*, then the vase will break.” If we would like to explain why the vase broke in the factory through the D-N model, we would state:

- C*₁: This glass vase is breakable (It belongs to the kind of breakable glass vases).
- C*₂: After this vase was struck with a hammer, *ceteris paribus*.
- L*: For each breakable glass vase of this kind if someone hits it with a hammer, *ceteris paribus*, the vase will break.
-
- E*: The vase broke.

⁹ In our context, it is a bundle of dispositional universals.

¹⁰ Nobody prevents a vase from breaking by strengthening the structure of the glass, for example by freezing it.

In this case L is our inductive generalisation; it does not capture the law as something ontological. Rather, in the case of L the name lawfulness, which is closer to the meaning of the universal manifestation of objects, would be more appropriate. The lawfulness of dispositional manifestations can also be expressed more generally, for example: “For all breakable bodies D , it is true that if they are acted upon by force F , they will break.”

If dispositional universalism is true, then the problem of induction occurring because of the empirical failure of our knowledge. Likewise, various deviations in measurement are the results of various environmental influences, which can be difficult to avoid; therefore, the effort of science is to define the given kind in the presence of the smallest possible external disturbing elements. If dispositionalism is true and universals exist, then we do not need to perform endless experiments to establish the truth of the proposition “If F , then G ” nor succumb to Humean scepticism, because, as Demarest claims (2017, 48):

Scientists need only perform a relatively small number of experiments on a single kind of particle before they feel confident that they have captured its true nature, or, in my terms, the essential dispositions of its potencies.

If some object occurs with an atomic number of 79, then it must always manifest itself as gold; this is metaphysically inevitable. Therefore, even nomic statements about the manifestations of gold must be universally true. A law is already an additional generalisation that we humans create from knowledge of dispositional universals in the presence of given stimuli and *ceteris paribus*. Laws are expressions of the lawfulness of dispositions.

8. Conclusion

To repeat, we will again recall the eleven points that characterise the nature of dispositional universals and thus the nature of the functioning of the world.

- 1) The world is made up of basic dispositional universals.
- 2) Basic dispositional universals are connected into bundles and thus create new objects through their mutual manifestations.

- 3) Dispositional universals of a higher order are manifested in different behaviours than the dispositional universals of a lower order from which they are composed.
- 4) Anything cannot be connected to anything.
- 5) Anything cannot be manifested in any way. (What is logically conceivable is not always metaphysically possible.)
- 6) Objects appear to us through their manifestations of dispositional universals, and we define them on the basis of these manifestations.
- 7) Dispositional universals are modal in nature.
- 8) Kinds exist at all levels of arrangement of dispositional universals.
- 9) If world events are conditioned by dispositional universals, then laws of nature do not exist.
- 10) World events are conditioned by dispositional universals.
- 11) Laws of nature do not exist.

Dispositional theorists arrive at the conclusion that laws of nature do not exist. This means that the world is not governed by some ideal laws from above, but the lawfulness itself comes from the dispositional nature of objects. According to the theory I propose, objects are bundles of dispositional universals instantiated in physical ether, like the traces of seal in wax. Dispositional universals govern the world by virtue of their metaphysical nature.

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