

GROUNDUP ONTOLOGY: A CARTESIAN PERSPECTIVE & EXEMPLIFICATIONS IN SCIENCE

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ABSTRACT: The first pathway toward a new conceptualist answer to the existence of universals begins with Descartes. The article is guided by a Cartesian method of starting anew in metaphysics and our knowledge of mind-dependent universals. Relevant examples and learning experiments defend and validate the pragmatic utility of conceptualism. It is past time for analytic ontology to set aside its assumptions, reevaluate its methodology and simplify itself. I raise novel objections through metaphor and analogy against standard and Platonic realism. Independent universals of realism are speculative and are neither necessary nor sufficient. This rejection of metaphysical realism defends the validity of scientific empiricist realism. Historical arguments such as William James' empirical conceptualism and J.S. Mill's criticisms strengthen this position. Nominalist methods are also considered. My theory is confirmed and useful for a preliminary epistemic-ontology which evaluates concepts and universals of mineral species. This appendix is consistent with Descartes' theory of attributes and provides a new important approach to this field of study. The article, long dormant, is made possible by the work of Rene Descartes.

KEYWORDS: conceptualism, anti-realism, Descartes, minerals, universals, realism

The huge scholarship on realism and anti-realism is an endless puzzle which remains intractable, and it is past time to begin anew to set aside the intricate collections of answers and make ontology easier. This article invigorates a basic Cartesian approach that utilizes a method of doubt toward versions of metaphysical realism and its conceptual toolkit. Scientific realism is separate and not in question here. The current divide between realism and nominalism is surely a false dichotomy, I argue. My position begins from the principle of parsimony and simplicity and foregoes current theories, and unnecessary terminology which excludes conceptualism. It is supported and applied with new light to the universals and concepts of minerals in nature, drawn from Descartes' research in science. Psychology learning models clarify and advance this conceptualist answer. This psychological research drafts the original conditions for universals without biased presuppositions. The term 'ground' refers to its foundational starting point, and in the literal sense, not its recent use in ontology. Metaphysical realism is the most prevalent position, nominalism second, and conceptualism is the perspicuous intuitive theory that universals exist in minds

Mark Maller

only. The full meaning and implications of conceptualism are overlooked in scholarship without good reason. New objections against realism are raised, historically, supported by William James and J.S. Mill's cogent theories of universals and concepts.

The general *idea* and purpose of the Cartesian method is valid and of universal value, even though his philosophical influence has waned because of major criticism. The problems are valid and serious, but the intellectual period 400 years ago must be taken into account. A novel direction in meta-episteme should need no justification, and arguing otherwise invites circular reasoning and is unphilosophical. The article maintains that ontology is *less complex* than scholars are aware. The minimum necessary criteria are examined, or the least common denominators of episteme-ontology which shows the sufficient reasons for positing universals. Readers are alerted to this intuitive approach and recall Descartes' famous guidance.

We must in the first place rid ourselves of our prejudices, and take the greatest care to set aside all the opinions we formerly accepted, until, applying to them further examination, we discover them to be true. We should afterward hold an orderly review of the notions we have within us... (Descartes 2000a, 253)*

1a. Descartes' Conceptualism

The term 'conceptualism' does not appear in his works but is attributed to his theory by Lloyd Nolan and others. The Evil Genius (malicious deceiver) Descartes imagines in *Meditations on First Philosophy* calls into question our fundamental assumptions and empirical knowledge, though it is well-known some of his basic assumptions were never questioned. The originality of his method (1619) reveals a trail for clearing away all questionable assumptions on reality, and discovering what is truly certain or beyond reasonable doubt, which is the unfulfilled dream of his philosophy. "We ought to turn the whole force of our minds to the smallest and simplest things and to stop there for a long time, until we become accustomed to intuiting the truth clearly and distinctly". (Descartes 2000b, 20)

In general, this rule is still useful, though often mistaken for Ockham's razor in popular usage. However, it is probable that he never used the rule through his career for his research devising mathematical rules (Schuster 1993, 221) who refers to the famous Discourse as a fiction. The important phrase 'clear and distinct' is often neither—or it is primarily subjective, not in the objective unbiased meaning. The general summary of Descartes' conceptualism that follows cannot fully do justice to

* Letters are used for references to Descartes' works.

the ambiguous and perplexing strands to his thought. His conceptualist philosophy is rather weak, considering he held that number and geometric forms exist eternally, compared to the contingent universals. Assuming the Evil Genius is not so evil, Descartes argues that mathematics, geometry and logic remain indubitable and universally true. In the fifth Meditation, geometric forms (figures) are eternal innate ideas and the forms cannot be recognized without them. These universals are God-given and understood through an intellectual process of abstraction and discovery. When universals are abstracted—taken out—they become reified as special entities when realists mistakenly posit their objective reality. (Nolan 1998, 171-75) Moreover,

Universals are *general* attributes, i.e. attributes like number considered in general and abstracted from all individual substances... for every attribute of a substance there is a corresponding universal at one greater level of abstraction.

—and universals are a corollary to his theory of attributes. I use ‘attribute’ interchangeable with property or characteristic, but Descartes also uses ‘attribute’ as a quality or mode. Thinking (the cogito) is the essential attribute of humans, he famously argued in *The Meditations*. However, his meaning of substance is ambiguous and inconsistent. It usually refers to the unobserved essence underlying corporeality of an object that properties adhere to, or possibly an independent stuff or entity¹ (Schechtman 2016, 155).

Most likely, both meanings are true for different kinds of things, and the former (unobserved essence) is probably closest to his definition. Descartes refers to attributes as modes in a substance. In “Rules for the Direction of the Mind”, Descartes states that all things, when compared to each other are relative or absolute. He calls absolute everything which contains in itself the pure and simple nature, considered independent, universal, equal, causes, similarity, such as chemical elements.

The relative “participates in the same nature”, generally, which involve relations: dependent, compounded, particular, unequal, dissimilar. Thus, regarding individuals, the species is an absolute and the genus category is a relative. In *Principles of Human Knowledge*,

Universals arise solely from the fact that we avail ourselves of one and the same idea (*concept*) in order to think of all individual things that have a certain similitude. When we understand under the same name all the objects represented by this idea, that name is universal. For example, when we see two stones or birds...we form in ourselves an idea of a certain number we call the number two, and when afterwards we see two birds or two trees... we again take up the same

¹ The word ‘understanding’ comes from *substance*, knowledge that stands under the object.

Mark Maller

idea we had before. This idea (concept) is universal. (Descartes 2000b, 246)²

Through this process, universals are understood and recollected from minds. This conceptualist position is an insightful starting point, but his argument remained unfinished, unfortunately perhaps because he could not reconcile his theory of innate ideas with universals and empirical concepts. In the recent past, conceptualism has been ignored, or included in a version of nominalism, except for John McDowell's theory (1996). The significant question of the mind-dependency of universals which distinguishes conceptualism from nominalism is mistakenly neglected as unimportant. Thus, it is undervalued, and because realism is more popular and consistent with mathematical and scientific theory. However, recent research indicates that neurobiologists may discover definite innate capacities for universal concepts in near future and confirm conceptualism scientifically, but realism not so.

With Descartes in the background, I introduce my conceptualist view which is distinctly different from Descartes and then raise objections against realism and nominalism. From herein the fundamental *idea* of Cartesian doubt is of value—walking toward Parsimony Avenue, rather than 'down the garden path' to realism.

1b. New Conceptualism

The method begins from an open-minded psychological approach, rather than the *a priori* logic of metaphysical mazes. Our priority is to utilize theory which advances and/or is pertinent to cogent empirical evidence and is intuitive. Immediately after a sense perception, the mind forms the concept of the object from observable physical objects to conceptual awareness. The words 'yellow' and 'soft' are from perceptions with those properties, e.g., sulphur. Hume states in his *Treatise* (1888, 6) that if a shade of color is not observed, the missing absent shade is inferred from the others like with paint samples. As we become older the way sense perceptions were learned is forgotten; that concepts and words for objects are pragmatic forms of language recalled from memory.

Properly, 'universal' is used as an adjective because as a noun it implies a real status of its own in addition to adjectives which become nouns. "Descartes is wise" becomes "Descartes has wisdom." Universals are conceptual names or words for groups of particulars that resemble each other in at least one aspect or same properties. One recognizes which general class or group the perceived object belongs to as a resembling thing. The name 'sulphur' signifies the class of resembling

² I added 'concept'.

particulars with numerous properties. One has a general concept of it when he/she points demonstratively to a specimen alone or in a group of minerals. Concepts, then, are mental representations. Typically, infants form the concept of yellow from an association of the word '*yellow*' reflected on objects perceived and elsewhere (in a dream). A pertinent example:

1. A yellow stone is observed on the ground.
2. A second, then third yellow stone of same or similar shade is observed.
3. The child attends to the visual resemblance. A conceptual thought of three occurs.
4. The concept of stone is formed or recalled from memory.
5. Concept of yellow stone is formed.
6. A second observer calls these stones sulphur. Identification occurs.

In the future, perceivers infer that a yellow stone of similar shade is probably sulphur, but errors occur because minerals are identified in many ways and color is only one attribute. Of course, it is very possible the mineral's name is forgotten, but the concepts of yellow and three remain indefinitely. Through the immediate experience, they are inductively categorized into concepts and the universals are created in memory. Conceptualism understands physical objects, such as pyrite, as properties that are universal concepts shared commonly by the particular things. The properties, for example, gold *color*, exact *hardness* of 6, chemical *composition*, its octagonal *form*, and *weight*, relative to size: all refer to pyrite (composed of sulphur and iron). If any one is removed, then it is not pyrite—it is X. These known 'universals' in thought represent the object, but the potential blank presence of the properties exists independent of knowledge. Symbolize P as the object, and its properties by their first letter. *P.g.h 6.s.o.* ⊃ pyrite—the imply symbol is the equal sign. Composite rocks like granite possess greater complexity if they are composed of several minerals. An advantage of this bundle theory is that similar examples/exemplifications work with plants and their products, microorganisms and manufactured objects, but space does not permit these complex analyses. Categorization 'cobweb' models in psychology demonstrate how general and specific models are subsumed and learned unsupervised. The conceptualizations should enable higher predictive advantages: (Iba and Langley 2011, 259). That is, preference is for the theoretical model which better predicts how empirical concepts are learned. The ontological commitment implicit in them refer to the model's pragmatic usefulness, not the way the world actually is *per se*. The word 'position' may and should substitute for 'commitment', which is too strong a word.

We begin with early experiences: consider children ages one-two years who have not formed concepts and presuppositions about the environment. Studies of Cartesian thinking with children enable understanding of how concepts and

Mark Maller

universals are originally formed and established. Experiments with children ages 4-14 confirm the ideas in Descartes' *Meditations*³. (Subbotsky 2015, 8-9) Rationalistic thinking begins about age seven, and easy abstract words are mostly learned at about age nine, and advanced terms in high school or later. Utilizing chronological age shows how individuals cross-culturally understand and process perceptions and concepts.

Try this new experiment consistent with Descartes' theory. Young or naive participants will observe and smell two flowers with distinctly different scents for the first time—alyssums and lilacs work. The flowers are smelled repeatedly and each time an unbiased monitor says clearly 'lilac' or 'alyssum'. Then the flowers are draped and their scents are smelled. Those with superior olfactory senses will recognize the flower, and over time its spoken name and scent become concepts. Lilacs of the same kinds and alyssums with stronger or fainter scents are utilized. After a period, the mind ascertains the interaction of scent and color, and it is recalled as a one over many universal. The lilac species becomes a subjective universal, like other flowers—a Universal flower is unimaginable. Universals, then, are general ideas of concepts, based on this experiment of resembling properties. The resemblance exemplar test in psychology may be utilized for learning how physical objects are categorized by their attributes and ascertain these concepts.⁴ (Nosfosky 2018, 1-7) This classifying method using resemblance for learning attributes is pragmatically consistent with conceptualism.

The mental image of physical objects, such as ordinary rocks and plants, initiates definite concepts consistent with Descartes' conceptualism. Thus, properties are not instantiated by universals—universals are created by properties. The observed property is primary and first, and only afterward are universals developed in the mind. Therefore, it is not necessary or justifiable to reify universals outside of spacetime, nor does it validate or confirm Platonic universals.

2. Objections to Conceptualism, Refuted

Conceptualists traditionally hold that the content of all experiences is wholly conceptual, but this position is not always important or unanimous, contrary to Roskies' criticism. (2010, 112-13) She assumes all conceptualists are committed to this view or they present arguments which support it. However, some perceptual content does not necessitate concepts, and many exceptions exist that include fuzzy

³ Subbotsky evaluates Descartes' questions and answers with children from Russia and UK in interviews.

⁴ Physical science is meant. In this study, most students retained images of the stones and names they observed and capably matched them with similar examples for recognition.

content from dreams, psychedelic experiences, rare awe-inspiring visions, and highly original visual or auditory experiences of new phenomena. Individuals with no concept of snow witness falling snow and are baffled. Nothing in their memories holds a corresponding concept, or else it is buried in their subconscious, nor will it be retained long. Primitives outside civilization have no concept of money among other things, even after they see it exchanged in a market. (They barter for goods). Citing the “Fineness of Grain” argument against conceptualism, she claims

if the content of experience is entirely conceptual, as conceptualism holds, then there can be no difference in perceptual experience without a difference in concepts deployed... it is implausible that you actually possess hundreds of distinct concepts of red. (Roskies 2010, 115)

Conceptualists agree this is implausible or impossible, even incredulous, and it is no criticism of conceptualism at all. The conceptualist need only assert that we possess one or two concepts of red, or any color, and many finely distinctive shades from softest to almost maroon, like an array of measured centimeters of color. Cultures may possess a greater number of words and concepts for an object or experience which are neither useful or necessary but these are exceptions, formally or in slang. For instance, different words for earth correspond to very few distinct concepts of it. Also, the concepts may be mistaken, too broad or narrow, misleading, and in general very subjective.

The Richness Argument fares no better. According to her view, visual experience would require a thousand words or concepts at a given moment, if perceptual content is totally conceptual. But again, this assertion does not follow because the conceptualist can claim 1) exceptional perceptual content has no concept, or 2) the conceptualist is not committed to, or claims a thousand (figuratively) concepts/words are needed, and may be only trivial. A picture may be worth a thousand words but not to conceptualism. Overall, Roskies reaches too far and her argument against conceptualism is overstated. Philosophers who endorsed conceptualism argued that all perceptual content is conceptual, including Aquinas, Locke and Kant, but contemporaries may not accept it. The conceptualist arguments of Kant and James are supportive to this position. Kant’s conceptualist position is weak, claims Baranovas, (2019, 93) but oddly he does not mention the most important reason: the unknowable reality of things-in-themselves and/or noumena. Kant famously shows “all human knowledge begins with intuitions, advances to concepts, and ends with ideas”, and originates with sensation. (Kant 2007, B731, 569)

William James’ strong empiricism, influenced from J.S. Mill, advances conceptualism in his classic *Principles of Psychology*. He distinguishes between a restricted particular and general conceptions of a class or something belonging to a

Mark Maller

class. Then the mind universalizes or individualizes the application, and one's thought refers to *this* white or *all possible* whites.

We must decide in favor of the conceptualists, and affirm that the power to think things, qualities, relations, or whatever other elements there may be, isolated and abstracted from the total experience in which they appear, is the most indisputable function of our thought. (James 1950, 452)

James' position develops from his stream of consciousness theory in which mental images of concepts are typically weak or vague, false and/or an unrepresentative. Images are the least important function of the concept and universal. Sense perceptions constantly change with every new experience even if very minor, as Hume argued. A new concept appears accompanied possibly by a changed universal.

In Dialectics, the concept of the attribute changes gradually until the new attribute replaces or negates the former. When a mineral is sufficiently heated, its attributes change, it may crumble and its appearance is altered. It is the same mineral but our concept of the specimen changes, e.g., from a gem to a worthless stone. One appearance is negated and opposite attributes become real, and the changes in color, chemicals and atoms develop into a different substance.

3. General and Metaphorical Objections to Realism

Platonic Forms and full metaphysical realism are non-intuitive answers that necessitate major justificational argument because the burden of proof is on one who posits special entities as real, not the arguer who rejects them. Metaphysical realists propose large numbers of concepts are eternal—these universals have real permanence independent of spacetime with or without exemplification by particulars, and are major tenets of its ontology. Scientists use the word 'universal' with non-ontological meanings, or endorse a realist objectivity, and mathematicians tend to accept Platonic theory. They hold geometric forms are true eternal universals with permanent existence, and exemplifications include crystals of natural kinds. Not surprisingly, philosophical analyses claim to discover deeper meanings and 'one over many' universals that are frequently unwarranted, subjective or unjustified, which has led to falsehoods and unnecessary controversy. When realists object to ostrich nominalism, anti-realists could propose 'pie in sky realism'—suggesting that objective universals are transcendental lofty ideas. Conceptualism, (if one prefers) may be called 'Cognitive Mental Realism' which implies intuition. Deep theory often provokes and advances interpretations intended as universal truths that lack significant or strong credibility, and reasons originate from the rationalist mind, and a psychological sensibility which searches for ever-lasting permanence to reality. In

metaphysics, examples are faith-based religious concepts, pseudoscience, or eternal entities. Descartes rightly notes,

Scholars not content with knowing what is clear and certain first hazarded further affirmations about obscure and unknown matters which they arrived at only probable conjectures and then gradually attaching to such matters a complete faith and mixing them indiscriminately with what is true and evident⁵ (Descartes 2000c, 5)

Historically, this is true for most rationalist philosophy before and after Descartes, especially in metaphysics and epistemology, though the problem of universals is neither obscure or unknown. Moreover, he believes people prefer yet are misguided by the profound groundless theories of philosophers instead of accepting clear simple answers.

One false assumption is that a well-defined common word must refer to something real in the mind or the world. *Redness*, *greenness*, and all color-ness words are typically expressed as properties, but these are merely names for attributes that denote colors and no credible reason justifies analysis of these suffixes, *per se*. Yellowness, brownness, orangeness and purpleness are not words (in English) because their meaning is redundant, as are whiteness and blackness. The suffix *ness* has insignificant meaning, referring to the condition or quality of objects and contributes nothing new to statements, such as “This rose is bright redness” or “Whiteness of calcite is clean.” Mill argues that whiteness and a white thing are only different word variations, utilized by convenience for referring to the same external fact under different relations. Furthermore, a distinction between a green color and the attribute green serves no justifiable purpose and is basically wordplay. Examples in ontology emphasize colors because other sensory attributes are fuzzy and subjectively too variable as real universals. The analyses of hypothetical red and blue spots increase excessive distinctions and overlooks the languages which have no words for some colors. Logically, universals for tastes, scents, and sounds are possible but they are highly variable, subjective and linguistically diverse.

Moreover, metaphysical and epistemology terms also include words possessing no universally accepted merit or truth-value. They serve abstract explanatory purposes such as the soul, Kant’s things-in-themselves, Platonic Forms, and defunct ideas like alchemy and Dalton’s atomic theory. A word does not necessarily represent anything except a mere idea of the Imagination or fancy, such as certain neologisms, ‘Being’, and the unintended reifications are often misleading or fallacious. Mill, the empiricist’s advocate, argues rightly that an *a priori* fallacy

⁵ Quote from 368 in text. 5 in cited book. This is true for academia today.

Mark Maller

occurs when we presume an exact correspondence between the rules of the mind and external things.

Its most remarkable manifestation consists in the personification of abstractions. Mankind in all ages have had a strong propensity to conclude that wherever there is a name, there must be a distinguishable separate entity corresponding to the name; and every complex idea which the mind has formed for itself...was considered to have an outward objective reality answering to it. Fate, Chance, Nature, Time, Space, were real beings, nay, even gods. (Mill 1973, 921)

Mill excludes imaginary things and fictional characters that no one proposes are real beings. The word 'reification' as a fallacy is substituted for personification, a literary term. Certainly, fate and chance are concepts for explaining unmitigated causation and unpredictability and time and space are necessary conditions for knowledge. Traditionally, realists have the propensity to posit concepts and ideas as real universals in a higher Realm or level. To refer to 'man' or 'humans', in general, does not imply an *a priori* universal Man, Woman, or Human. Similarly, the universal mineral is not entailed from random minerals. However, Mill does not fully explain this and his discussion is cursory.

The prominent chemist Friedrich Paneth defended existential objective universals of elements and basic unobservable substances. (Hijmans 2020, 242-245). Paneth's notion of transcendental universals (entities) is a Kantian-influenced theory this article opposes. Moreover, the chemical element is a conceptual universal apart from its exemplifications. Samples of copper are not the element 'copper', just as samples of quartz are not the species 'quartz'. (Sharlow 2006, 8) Pure mineral specimens rarely exist on earth. The exact formula is not found as a perfect specimen in the world.

Quartz does not exist in nature (or in the laboratory), because every quartz specimen has myriad trace and minor elements... crystal size, shape, and many other information-rich attributes that distinguish one sample from the next. (Cleland in Talbot 2020)

This ontological distinction is necessary and not merely semantic. Agreeably, elements are empirical entities or simple observable substances, contrasted with basic (unobservable) substances. Noumena or things-in-themselves are at the unknowable level, and contrary to Klaus Ruthenberg, it is *necessary* to show or prove their existence. (Ruthenberg 2009, 79) Unfalsifiable hypotheses and ideas without definite evidence are and should be insufficient. The specific empirical or hypothetical context is important for determining their reality, and the conventions and customs of science are ideally based on this knowledge. Kant noted it is very possible (and laudatory) to accept empirical realism in epistemology and

conceptualism in metaphysics, though he does not state it such. Empirical (scientific) realism can be held consistent with metaphysical realism though it may seem implausible. ‘Objective’ sensory knowledge is essentially human (and perhaps animal) and is only possible through humans. Thus, ‘objective’ does not mean God-given or absolute; clearly it is dependent on human observations. ‘Subjective knowledge’ here entails greater dependence on individual minds (consciousness), cultural variability, bias and habits. This article contends that nature is objectively real, and universals of sense objects are mind-dependent and valid for scientific investigations and knowledge, even with some doubts. Scientists assume nature is objectively real, and some define universals as concepts possessing commonality over particulars, which is consistent but not the same as my position. In the larger picture, metaphysics is foundational for science, but this is not always recognized in the present.

I now turn to *a priori* universals. The inferential move from concrete particulars to *a priori* universals outside of spacetime is *prima facie* a leap of cognition—not unlike assuming the real world exists outside and above dark shadows on the wall of a cave. The reality is that climbing up the stairs does not lead anywhere—no enlightenment occurs, only to a cul-de-sac—and the myth of the cave is reversed. Platonic Forms and multitudes of universals can be attractive and persuasive, yet to unbiased doubters these are inventions of the mind elevated to an *a priori* level and dressed in symbolic logic. This ancient metaphor is a rough analogy yet it underlies an important objection to realism—universals are attributed an exalted status like a powerless metaphysical exponent, and unlike mathematics, they have a symbolic existence with pseudo-reality. Numeral exponents possess symbolic higher power necessary for solving problems, but objective universals are unnecessary for resolving metaphysical problems. In another example, suppose a weather expert observes helium balloons modeled from physical objects, near unusual atmospheric phenomena. He mistakes these balloons as perfect transcendent originals of the physical objects—but they are merely puffs of clouds—false images which appear to be real. Universals are like the balloons, symbolizing and analogous to full-blown inflated concepts. This metaphor questions the exaggerated veracity of metaphysical realism and objectivity of immutable universals.

Where do universals exist? For metaphysical realism, the question is facetious and unwarranted. GroundUp doubters hold that realism implies or is consistent with the existence of an unobservable realm less knowable than quarks. Some could question (with sarcasm) whether universals exist independent of mind because realists claim this, or do realists believe universals exist independently because they

Mark Maller

are independent. Does the existence of universals depend on realists, such that if they all changed their minds, would universals no longer exist? The Heaven of Forms was rejected as a fictional remnant of metaphysical rationalism, except for serious Platonists, yet universals remain with new words for a fanciful reality. All the pagan gods through history existed because adamant believers were certain of their existence. In the end, none were disproven—their believers passed on, Christianity was adopted, and the gods became irrelevant. Obviously, the gods are not universals, but the analogy works on its premise both were (or are) beliefs of objectively real existents which denote phenomena, ideas, and reality—whether universals would exist is unknowable. The existence of abstract *a priori* universals is defensible in a future paper—however, permit a speculation. If any real universals exist in the broadest possible sense, they are necessarily intrinsic to the cosmos: existence, chaos, and number in general. In physics they would exist hypothetically as intrinsically absolute *a priori* realities. Mikhail Epstein, influenced by Mill, claims objects possess potential possibilities.

In fact, no universals exist outside the potentiality and universality of thinking itself... any individual object can be thought of philosophically if taken as a sum of its possibilities, only one of which corresponds to the reality of the given object. (Epstein 2019, 118)

This implies that Platonic Forms and universals conceivably exist in some possible worlds in modal logic and it is speculation in this one. The concepts of 'mineral', 'rock' and the idea of 'concept' itself would not exist outside of mind and spacetime. If they were objectively real, then in theory this would be true for thousands of mineral species which is highly implausible. Aristotle strongly objected to Plato's abundance or surplus of unnecessary Forms (Ideas) in the *Metaphysics*. Assuming real universals came into existence with humans, this raises questions when or if it occurred. Consider now the potential metaphysical conditions in a pre-human world.

Flashback in Time

Try to imagine a pre-human world without animals over ten million years ago. Primary and secondary qualities could not factually exist because no humans or higher species perceived them; attributes would be only potential or conditional for humans. It is difficult to visualize or imagine this world, except through film and art, and then one observer—the *I*—is still present. Colors or squares would conditionally exist if humans were there to perceive them, only *hypothetically* independent of mind. Universals and concepts exist in sentences phrased as *would be true if—minds were present*. Prior to discovery, all nature including rock formations exist without

being perceived as merely unknown material things. This scenario is inspired by James' thought experiment of a pre-human world where no *a priori* ethics are possible in his essay "The Moral Philosopher and the Moral Life".

Five to six million years ago the Grand Canyon (USA) existed and no knowledge of or about it was possible. Its geological dimensions, colors, location, and attributes would have been unknown until intelligent humans were present, or possibly humanoids. Therefore, universal entities and properties of objects existed only *conditionally* when the first human ancestor perceived it—the variety of details and distinctions are unmemorable. Stones usually accrue special meaning and value through ownership, human praxis. The universals of attributes, concepts, and the like would be non-existent; they are only employed in this example on this hypothesis. One might object universals existed beyond spacetime under all conditions but this is speculation even with the presence of humanity. Now if universals are timeless and immutable, the question turns on causation, whether they are a divine creation or inexplicably existed prior to the world, or when Platonic Forms supposedly came into being? It is unknowable at what point within, or prior to humans the existence of universal entities was possible, or if they existed at the Beginning or from eternity? Metaphysics has no answers.

Conceptualists and nominalists agree that resembling concrete particulars share similar colors and other properties, but these words do not represent objective universals. One standard objection is that 'resemblance' is a universal as a ubiquitous relation between similar things. The word 'similarity' is also a universal and so, too, difference. Conceptualism holds these words represent important concepts in the mind and that is all. Nominalism, consistent with bare subjectivism, claims only words or signs exist, and more inclusive versions admit mental concepts. In both positions, contending that resemblance or similarity are objective permanent universals seem superfluous, like ontological accessories. This is true for a myriad of universals, but an entire thesaurus would be needed, though impossible to analyze every potential concept to determine whether it is an objective universal. Toward this end, Ockham's Razor should be strictly utilized.⁶ An important admonition cautions against overestimating the probability or scope of arguments and conclusions that may be validly inferred from empirical and *a priori* statements which upholds the integrity and truth-making of science.

Thus far, I have outlined the least common denominators in ontology as meta-metaphysics, the minimum necessary for a theory of universals. In summary: the

⁶ Originally, Ockham wrote entities ought not be multiplied beyond plurality, which scholars interpreted as necessity, and is not original with him. This paper accepts the latter for a *priori* entities. The word 'entity' is too broad and general for most purposes.

Mark Maller

Cartesian principle of doubt, mind-dependent universals, concepts, images, attributes, and James' thought experiment. However, independent universals of nature are out of bounds and have no value to ground up ontology. In the appendix is an explanation why and how conceptualist thought is foundational to mineralogy, and appreciates the contribution of Descartes' theory of geology and stones.

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“Give me matter and motion and I will construct the universe.”

Descartes' examples of stones in the *Discourse* and *Principles* indicate they were relevant to his metaphysics. He refers to rocks and minerals as simply stones without semantic distinctions. In one example, stones are mentioned, and again where he mistakenly claims we cannot understand the stone's motion and shape without knowing its substance. (Descartes 2000d, 30) In fact, it is unnecessary to know its substance (essence) to understand its motion and shape—only the weight is necessary. Rocks and metals are mentioned, and his example of perceptual errors when copper and glass are mistaken for gold and diamonds in *Discourse*. (Descartes 2000d, 24, line 2) Further on, he claims falsely that air, water, minerals and the like are relatively easier to know, and it is impossible to distinguish the particulars from their infinite variety, placed here from God. The most general *real* things, he states, are duration, substance, motion and order. Based on this, one surmises the deep time of stones is its duration through motions, the substance its composition, the motion its actual geological movement, and order is its inherent structure of molecules, cleavage, etc. Stones are inherently very real for Descartes who believed there are degrees of reality. However, in this period knowledge of stones was infamously conflated with superstition and strange falsehoods. Although no mineralogist, he intended to develop his vision of geology and descriptions and origin of stones as if to reestablish a foundation for the earth as he attempted in philosophy. The Sciences, he strongly implies, are logically interdependent and interconnected within a whole insofar as the objects can be intuited by the intellect. (Dika 2023, 72) His mechanical philosophy was controversial and simplistic, yet this erroneous scheme influenced earth science in France for almost a hundred years⁷. (Oldroyd 1974, 74-79)

⁷ The dissertation is an interesting study of science in the modern period. Gemstones were believed to possess magical powers for their owners.

Concluding Summary

Overall, Descartes' conceptualism leads in the right direction to answer the problem of universals and its relevance to earth science, combined with a suitable scientific empiricism compatible with Cartesian theory. Concepts of objects are best explained by conceptualism or nominalism, the theory that words are a line of ordered letters. The universals of realism are rather mysterious and speculative (with exceptions?) but plausibly geometric shapes are eternally real. Universals of minerals are primarily based on the chemical composition, yet this is an idealized fiction not found in nature. Furthermore, the universals are often too general and variable to exist as such in minds. The number of concepts and universals for over 5600 mineral species, (and in biology) is impossible to estimate. The most common minerals with slight variations would facilitate stronger concepts and possibly universals.

Implying a weak relativism, it is probable the three metaphysical theories are partly true and untrue in a total encompassing ontology. No single answer includes the total truth but conceptualism comes closest and is the most intuitive common sense. The realism-anti-realism debate is timeless and extraordinary in philosophy, analogous to a jigsaw puzzle, except no one agrees what the final picture looks like, nor the arrangement of pieces, and which ones are necessary. Finally, objections against conceptualism are based primarily on speculation, clever fine distinctions and biased interpretations. Rejecting conceptualism for these reasons is throwing the philosophers' baby out with the bath water. And that no philosopher or scientist should do.

For those interested in mineral science or a further understanding how concepts and universals provide a framework to minerals as natural things, an appendix follows.

APPENDIX

Descartes was familiar with Agricola (1494-1555), called the modern father of mineralogy, and Anselmus de Boodt (1550-1632) a 'Renaissance man' who authored a treatise on mineralogy. Agricola's work was strongly influenced by Aristotle, who was the first to research and write descriptions of minerals in *Meteorology*. Descartes was an authority on geometrical optics, particularly refraction—a natural phenomenon for crystals and crystallography. He wrote a detailed theory of the earth's geology using deductive logic in the *Principles* and was familiar with minerals such as sulphur and agate.

Mark Maller

Ontology of Minerals

Mineralogy has no fundamental metaphysics; thus it is essential to outline the premises that show how (or if) concepts and universals are formed and their place in this branch of geology. Therefore, it presents an excellent example for this meta-investigation into ontological universals of minerals. Philosophical theories of minerals are rare because scientists regard metaphysics as irrelevant for research purposes. Generally, geologists and scientists are unconcerned with the philosophical presuppositions in scientific research. In mineralogy, the trend for analyzing natural kinds is mainly a semantic and deductive classification issue which minimizes ontology as the study of being and is *not* our intention. Mineralogists analyze and determine properties of minerals, using deduction and inductively, focused on empirical descriptions. Metaphysics is pertinent for understanding universals, and how concepts are formed contributes value and depth to mineralogy. The closest subject is chemistry, and its philosophical theories of elements and classification are significant for establishing its foundations. Mineralogy has no such foundation, and is essentially derivative from inorganic chemistry insofar as elements are simple substances of minerals which are not reducible further. The diagram is a broad general overview.

GEOLOGY

eras of time
petrology

rock origins
kinds
specimens

CHEMISTRY

inorganic

MINERALOGY

classification classes
chemical composition
specimens

GEOMETRY

geometrical shapes/forms
atomic structure of forms
crystallography

cubic, hexagonal, tetragonal, etc.

Mineralogy is informed and developed through chemistry and figures (forms) within geometrical groups in crystallography. Crystal formation is highly complex, represented by intricate atomic configurations and conceptualized by mind dependent universals. The chemical compositions are organized into classes and mineral species, specimens (exemplifications), with mental concepts and/or general images of them. Distinct concepts of ordinary common rocks exist mentally, consistent with Descartes, but their objective existence as universals is implausible.

The taxonomy and classification of over 5600 mineral species divided into seven groups are important for understanding their concepts and universals. A formal definition of mineral species is not standardized, and is disadvantageous for a

suitable ontology but recently a new definition was created.⁸ (Hawthorne et al 2021, 125) Minerals are classified by their nature, and by definition, all possess:

Chemical composition, Internal atomic structure, Crystalline formation, normally, Creation by geological forces; Solidity and weight.

Its hardness, cleavage, specific gravity, and geometrical crystal form are identical intrinsic properties of the species. Color is a fundamental property for some minerals and in others only variable or accidental. Petrology, the study of rocks, is classified differently as aggregates of minerals, not by common public usage. The three types of rocks and their chemical compositions vary by the integrated minerals within them.

The chemical composition is the substance itself in solid inorganic form. Two distinct mineral kinds can have the same chemical composition and differ only by their crystal structure. The formula is its essential nature which varies by minor differences, such as trace elements that affect color and structure as conceptualized. The universal expresses idealized perfection—the specimens possess defects, chemical inclusions, and other modifications.

Currently, the criteria of formally classifying minerals are being reprioritized by geologists Robert Hazen⁹ (2019, 810) and associates. This original project categorizes minerals using an evolutionary planetary hierarchy, which explains their origins in time and material processes with greater accuracy. Traditionally, the classification of minerals is time-independent (like biology) according to its chemical composition group. This system developed in 1848 presupposes or assumes chemical compositions of minerals are idealizations but this is a fiction. After minerals are reevaluated and classified, their scientific concepts and/or universals will include their new definitions.

The ways minerals are named is also relevant with different terms in other languages. As no regulated system exists, they are typically named after the discoverer, from folk myths, and translations from classical origins—their exact meanings are often insignificant or forgotten. (Schumann 1993, 5-6). The nomenclature consists of words for a huge assortment of particulars grouped as a species with resembling attributes. If the minerals were named based on the

⁸ The set of imperfect copies of the corresponding archetype (sic) is defined by theoretical universals, bond topology and chemical composition, he notes (125-31).

⁹ Classifying minerals by geological time or evolutionary causality will not replace the current methodology, but instead changes the priority of using chemical composition as its basis. This system utilizes A.I to approximate the deep time of minerals. However, it is improbable that all concepts of mineral species will be reevaluated. He notes the first mineral in the cosmos was nanocrystalline diamond more than 13 billion years ago.

Mark Maller

chemical composition or other objective attributes, these concepts could be posited as universals with common meanings or a nature. However, the unsystematic myriad of names advances or suggests a nominalist theory, especially for sparse minerals without or weak corresponding concepts—and only for certain mineralogists. Specialists would possess distinct concepts for a select number, but it is impossible to hold separate distinct concepts for thousands of uncommon and rare minerals from knowledge of particulars, the species, or mental images of them.

Individuals in the field hold different concepts of some minerals, and the mental images vary by color, locality and uses for a variety of stones. Probably no identical conceptual image of decorative agate (silica SiO₂) is possible because it has a variety of different colors and swirls. Of course, the concept of a color (white) does not change when the white object becomes black, James asserts (1950, 29) but our concept of the mineral may change. Subjectively, concepts are changeless but this is inconsistent with introspection and theories of mineralogy. One posits universals by observing samples, and then creating the mental image or idea—*not* beginning with the universal and pointing out the specimens in nature. For some minerals and rocks, like volcanic obsidian, the concept and universal are identical in the mind.

Gold and diamonds are classic examples. Strong mental representations of precious gems and native elements are common, but no cogent argument shows they are objective universal entities. The universal of gold would not exist independent of humans without gold samples (specimens). In the prehuman scenario, gems would exist only as unknown material stuff—worthless because values are non-existent or nothing without a Valuer, assuming only humans bring genuine value to the world. As a thought experiment, if all gold or diamonds disappeared in the future, it would remain only as a potential concept in memories. The belief that our memories and concepts are very real is pleasing and wishful, yet objectively this is an illusion I propose. The common belief is that gold and precious diamonds possess intrinsic value because of their highly desired attributes, yet this value is *not* within the mineral or a property of it—rather it is a signifying meaning of the concepts or universal. However, the notion of its universal concept existing independent of mind is highly implausible for scientific conceptualism, but subjective universals may be defined with objective meanings.

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