Abstraction as Dissection of a Flat "Ontology": The Illusiveness of Levels

Abstract: The intention of the following is to handle the question of the unity of science in a way that acknowledges the theory-ladenness of the world and the pragmatic nature of knowledge. The argument present will not be linear, but one more like a web diagram, arriving a consequence by way of consilience, namely, that the world possess a flat "ontology." Among the bases for this claim is that there is no such thing as a strict dichotomy between epistemology and ontology, providing the *conditio sine qua non* for a flat "ontology." The central idea advanced will be that the contents of the scientist's consciousness —and, more accurately, the contents of any subject's consciousness— are onto-epistemic in nature; that is, objects, events, entities, and so on, are understood only insofar as they are pragmatically understood —the only kind of understanding there is to be had. An excursion in the explication of the interest-dependent nature of scientific explanation, throughout the sciences, will support this thesis, as will a more detailed account look at the pragmatics of explanation, whose bidirectionality of explanation necessitates such a conclusion. All of these elements, working in tandem, present suggest flat "ontology," which presents a pluralist, anti-fundamentalist approach to levels and emergence, showing the illusive nature of levels, and inverting the current picture of emergence.

"Man can embody truth, but he cannot know it."

--William Butler Yeats

Introduction

The argument in this paper is structured in such a way to argue for a flat ontology; but the argument is not linear, and will be presented as a kind of web. That is to say, the following is argument by consilience. By argument's end, the interconnectedness of the argument will have

manifested itself in the numerous relationships between ideas employed, like pragmatism and theory-ladenness, bound together by van Fraassen's pragmatics of explanation —all such relationships pushing toward the conclusion of a flat ontology of onto-epistemic entities. Ultimately, the notion of flat ontology will be used to assert that "levels" are illusive. Developing a basis upon which to proceed, it is reasonable to begin with theory-ladenness, once the meaning of "flat ontology" has been given preliminary treatment. For this, Manuel DeLanda has developed a good starting point.

> …while an ontology based on relations between general types and particular instances is *hierarchical*, each level representing a different ontological category (organism, species, genera) [or strings, quarks, baryons], an approach in terms of interacting parts and emergent wholes leads to a *flat ontology*, one made exclusively of unique, singular individuals, differing in spatio-temporal scale but not in ontological status (DeLanda 58). [1]

The follow discussion, however, seeks to go further than DeLanda's account of hierarchy, extending it to all entities of spatio-temporal entities, thus the interjection of "strings, quarks, baryons" into the quote. That this extension is natural should be clear once van Fraassen's role in this level-denying consilience, here presented. Furthermore, van Fraassen's account will be employed to illustrate why *any* level-like organization attributed to the components of an explanation has no bearing on the explanation, and arises due to two things: 1) erroneously clumping together all types of belief statements into a single branch of philosophy that deals with knowledge, and 2) attempting to stratify the causal thicket that is the world, so as conform the produce of scientific enterprise with monism and fundamentalist predilections. Finally, there is one other way in which the present account differs from DeLanda's flat ontology (here, we

simply go a bit further, not necessarily deviating as much as extending treatment), which shall be discussed, when touching upon Kant's antinomy of teleology: the idea that levels of mechanisms telescopes to a flat ontology, as every part and whole enjoys the same status in a scientific explanation, and only differ in size.[1] To give the reader an idea of what this web of arguments pointing toward a flat ontology will look like, and for future reference back to, let the following be a rough guide to the big picture:

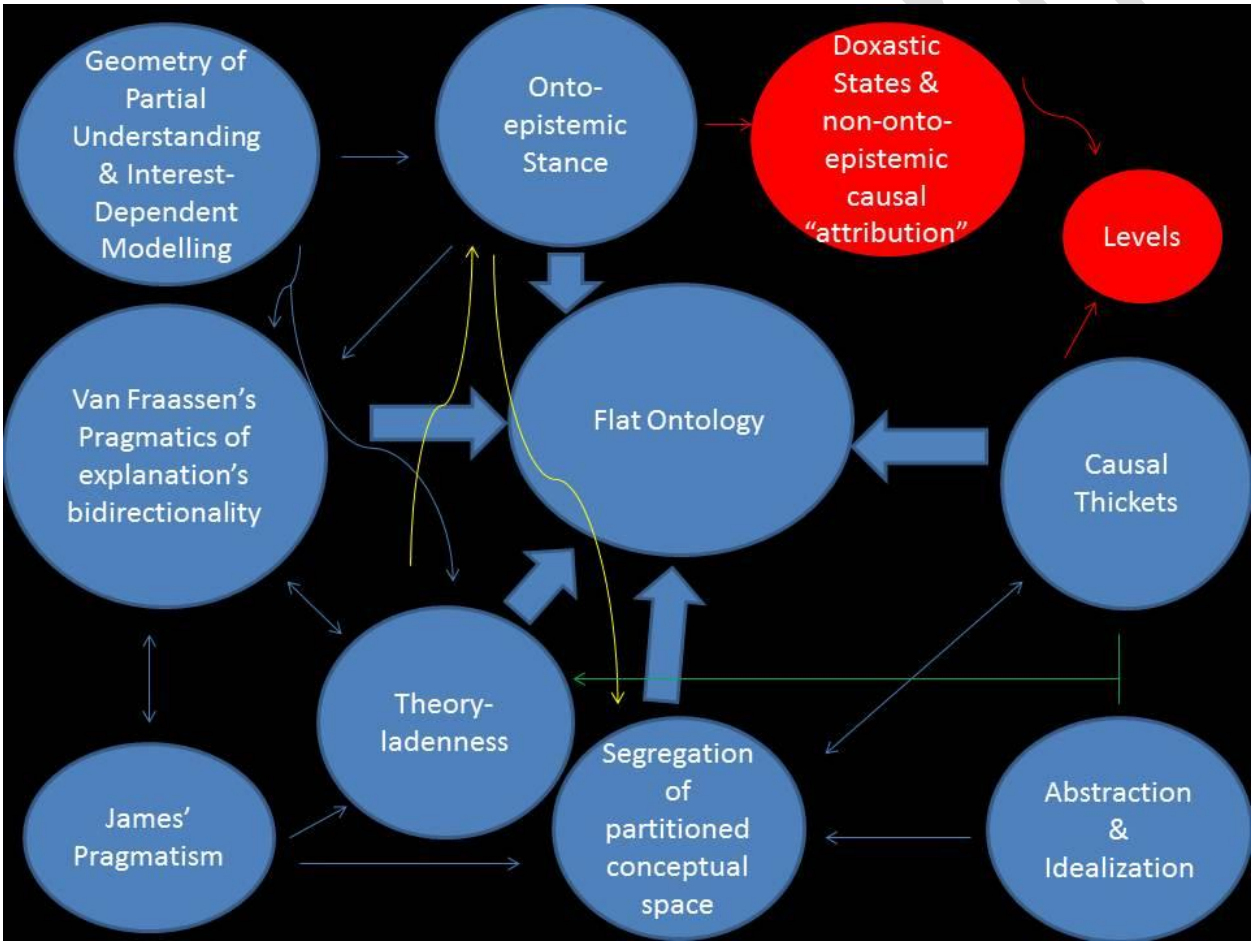

Figure 1: The larger arrows point toward the conclusion of consilience. The smaller arrows suggest relationships that create cooperation toward the thesis. The blue bubbles represent the positive web of notions that cohere, and the red bubbles are those notions that are excluded from web. The red arrows indicate where the ideas not included in the web arise, and the totality of this paper works toward a final explication as to why these are to be excluded. There are a few thin blue lines that are not included, because they would make a mess of the image, such as a line connecting abstraction and James' pragmatism. However, the paper endeavors to make these connections clear, for example, quoting James to

[1] "Levels of mechanisms" has been chosen for specificity, but the kind of telescoping should extend to all level-laden worldviews, based on the argument that will be given.

> show that James presents an idea that seems a precursor to Cartwright's notion of abstraction. (Note: Yellow lines are really blue lines, but are yellow to avoid confusion that might ensue from blue lines passing through blue bubbles. Green lines are to indicate additivity. The red lines denote notions not connected to the web, yet bear some relation to ideas in the web, and which will be explicitly illustrated in the text as not being a part of the web.)

The larger part of this exposition entails outlining and discussing the specifics of theory-ladenness and the need for an onto-epistemic classification of entities, the latter of which stands in stark contradistinction to the artificial dichotomy between ontology and epistemology. The central goal of this paper is to recast with greater specificity and exfoliation what is meant in science, vis-à-vis the unity of science, by the word "levels." This can be done by appropriating a different, more accurate status, the onto-epistemic status, to the objects/relations in the world and entities[2] of science. The primary motivation in doing this is to develop a satisfactory and consistent way of discussing and thinking about theory-laden experience, as other accounts appear incomplete (e.g., Hanson's, Kuhn's, and van Fraassen's). It is important to note that there are ostensibly two tiers in theory-ladenness accounts of science, and these cause confusion in the work of N. R. Hanson and Kuhn. Once it is clear how the onto-epistemic status clears up numerous misunderstandings in the way entities are discussed and thought about, it will also be clear how the status is relevant to levels in considerations regarding the unity of science.

Two examples, adumbrated above, jump out. The first is N.R. Hanson's Necker cube, in which the viewer sees that there are two different ways of seeing it, and says, "Do I put different interpretations on [the Necker cube] when I see it now as a box from below, and now as a cube from above? I am unaware aware of no such thing. … [O]ne does not soak up an optical pattern and then clamp an interpretation on it" (Hanson 135-136). The second, and much more forceful, is Kuhn's employment of Postman and Bruner's 1949 paper, "On the perception of Incongruity:

[2] "Entities" will be used broadly and generically, and will only be unpacked in specific cases to alleviate possible points of confusion. The term will be used to denote such things as objects and relations between objects — anything of onto-epistemic status that the subject stands in relation to.

A Paradigm," which demonstrated just how intertwined the ontological and epistemological are (Kuhn 62-63). Here, the suggestion is to, not simply treat the salient features of the subject's phenomenal plane and experience as simply "theory-laden," but to go further, suggesting that the features are understood as entities insofar as they are undergirded by and within the epistemology of the subject, and stand out by virtue of such. Often misjudged as being the relevant part of Bruner and Postman's experiment is that, even though the subject was "tricked" into thinking that he or she saw one thing, really the individual saw a black four of hearts, which says something about the "inadequacy" of cognition (Bruner and Postman 209). The really relevant finding, which Kuhn only began to move toward, is that the subject's world and its salient features (entities) are determined by the subject's understanding of it. In other words, the data (the "ontology") constrains the "epistemology," the "epistemology" permits the subject to stand in relation to the data. Without this onto-epistemic co-dependence, there is no ontology or epistemology, only James' blooming buzzing confusion (Hanson 144, *The Principles of Psychology* 462). This calls to mind the pragmatist's maxim. As Alistair Macfarlane puts it, in part quoting Peirce:

> 'Consider what effects which might conceivably have practical bearings we might conceive the object of our conception to have. *Then our conception of the effect is the whole of our conception of the object*' – in other words, Pragmatism is the philosophy that the whole meaning anything has for us is the perceivable effects it produces (Macfarlane) (emphasis added).

However, this does not go far enough, as it treats "objects as" rather than taking a stricter, more "metaphysically nihilistic" stance that entails the position that the object is the conception; the conception is the object. Therefore, it may be a mistake[3] to decompose the onto-epistmic nature of entities into ontology and epistemology, because doing so immediately yields questions about

[3] The reader may be concerned about the imposed exclusivity of onto-epistemic status, limiting contents of consciousness to a single state, these concerns will be assuaged in the discussion of doxastics states.

an epistemology of ontology beyond what is immediately known about the entities (beyond the subject's conception of it), whereas, within the onto-epistemic perspective, the entity is what is known and what is known is the entity; a question about knowing something beyond the knowing would, then, not quite make sense. There is, however, one caveat lector that needs implementing, before further discussing theory-ladenness.

The issue is, again, one not addressed by either Kuhn or Hanson: that there seems to be a distinction between psycho-cognitive theory-ladenness and constructed rational structure, such as that in science. While Hanson and Kuhn note the links between scientific perspective (with respect to the data) and psychology/cognitive science, they do not have much of anything to say, as far as the difference between them, namely, why gestalt shifts and such seem to be much less voluntary, while scientific perspective is much more variable —in fact, in interest-dependent modeling in science, it is within reason to have a scientist working in two separate camps, proceeding under the auspices of different assumptions, even though the modeling methods make assumptions contrary to one another's. Somewhat beyond doubt is the fact that scientists can, to an extent, change the way they view the world, at whim. (The "to an extent" part is a consequence of van Fraassen's background knowledge, K, and will be discussed later.) Kuhn illustrates his indecision on this matter, saying, "Either as metaphor or because it reflects the nature of the mind, that psychological experiment provides a wonderfully simple and cogent schema for the process of scientific discovery" (Kuhn 64). While there may or may not be a distinction between, what herein will be called, the psycho-cognitive tier of onto-epistemic entities and the constructed-rational tier of onto-epistemic entities, this paper will treat them as separate and distinct —though the arguments presented in this paper shall represent the tools and grounds to demonstrate that there is absolutely no distinction that can be drawn between them.

The obvious way to understand the distinction is through Latour's empirical, the former, which refers to the realm of the senses; and the empiricist, which refers to the realm of reasoned goings-on that are thought to be the non-phenomenal correlates to the observed phenomena. Simply put, there is the phenomenal and the non-phenomenal, and that which is not immediately available to the senses is non-phenomenal. (As Arabatzis points out, establishing the observable-unobservable boundary is no simple business, a sufficient reason for not dealing with the issue head on (Arabatzis 127)). The commonality between the two tiers should be striking, because of the pragmatic thinking that underlies both: though "observability" and "unobservabilty," one may argue, distinguishes the empirical and the empiricist, both tiers contain entities to which the subject stands in relation. The commonality that disregards observability/unobservability is the onto-epistemic entities that the subject encounters in the laboratory, under the telescope, or in the abstract symbols on paper, and it is through the collection of all of these onto-epistemic entities that the subject has a theory-laden weltanschauung.

An important qualification needs to be made, one that Steve Clarke has made explicitly, regarding the internal completeness, internal discreteness, and internal coherence of weltanschauung. In his view, it is essentially untenable for one (Clarke picks on Rorty) to maintain purity, isolation, completeness, and internal coherence that so many predicate to Kuhn's paradigm, and notes, almost with a hint of irony, that:

> Kuhn himself was pilloried for appearing to hold such a vulgar view in the natural sciences, and in a series of articles he attempted to clarify his position to show that, despite appearances, an extreme conception of incommensurability is not implicit in his account of historical development of the natural sciences (Clark 13).

In other words, worldviews need not be monist or fundamentalist, insofar as general theory-ladeness approaches are concerned; which is to say, the constructivist assertions about what theory-ladenness must do, in projecting order, is dismissed by the onto-epistemic classification, because it is only sort of true.[4] From here, once the nature of scientific understanding has been explored, the developed line of thought will illustrate why the ontological status of emergence can be revoked, and why it appears at all that properties emerge.

The Geometry of "Partial" Understanding

In a forthcoming work by Colin Allen, called "The Geometry of Partial Understanding," he suggests a metaphor that adds pliability to the way scientific modeling (and research projects, in general) is viewed. Instead of viewing competing models that are at metaphysical odds with one another, he offers a (pluralist) pragmatic view, which sees any given model as an orthographic projection of an object onto a plane, thereby allowing for underlying consistency among the collection of projections. This idea is not too complicated: Given any two shapes in n dimensions, it is not necessarily the case that these two shapes are really at odds when one considers the $n+1^{th}$ dimensional shape, of which the n-dimensional objects are underdetermined representations ("The Geometry of Partial Understanding" *forthcoming*). He also adds in other metaphorical, perspectival-aiding elements, such as lenses that allow for different degrees of blurring. His point —a point very relevant in science, where scientists often pick fights on metaphysical issues, even when claiming that it is not philosophy that they have wandered into— is that researches with conflicting scientific approaches need not view one another as competing.

[4] Clarke pg. 47 discusses the constructivist position in relation to fundamentalism.

As long as the products of the research yield scientifically relevant results, those researchers and their programs may coexist without compulsion and desire try to expel the other.

An illustration of this was given by Allen at Indiana University's 2012 Nelson Lecture, entitled *Meerkats, Monkeys, and Information*. There has been a great deal of curiosity about whether animal cognition employs some sort of meaning in communication or not. The example used monkeys and meerkats, whereby there seems to be a scientifically grounded legitimacy to treat sounds exchanges either as squawks that (given some discriminative threshold, not unlike those found in basic digital circuits) determine whether an autonomic response is instantiated; or as an exchange of meaningful information that is processed in a fashion similar to Peircean semiotics. The untidiness of the data and interest dependence of the research's orientation affords for either treatment of the animal behavior. The metaphor superimposed upon this particular example would be that the Peircean camp is an oblate circular representation of what really is the case, and the autonomic adherents correlate to a rectangular representation, two shapes at odds with one another; but these, Allen contends, might be thought of as orthographic projections of a cylinder, the first looking at the circular face of the cylinder at an angle, the latter from above, thus reconciling the perspectives.

The above example is illustrative, in that it provides a well-reasoned basis to permit science to advance in cases where there might be some reticence about permitting science to be "internally inconsistent," or at least apparently so. However, the presupposition of the cylinder's existence is more of a way of assuaging fears and concerns within the scientific community than it is an a real entity. Even the metaphor, itself, admits some uncertainty, proposing "this is how things might be." With the onto-epistemic classification, there is no basis for asking the question of what there really is, besides the oblate circle and the rectangle. There are two primary reasons

for introducing Allen's metaphor: 1) even if admitting that such a thing as metaphysics were a legitimate topic of discussion, the view of scientific research should carry on unfettered by programs that are at odds, and 2) to illustrate that the onto-epistemic classification requires a double move, so to speak. This double move is really just the acknowledgment that a "flat ontology" is necessary to fully implement onto-epistemic theory-ladenness into the sciences.

If it isn't completely clear to the reader why Allen's discussion motivates the introduction of flat ontology, consider this: the scientists studying the meerkats are looking at the same system, but are seeing different things. If the onto-epistemic classification is the proper way to view the meerkats, their audible calls, etc., and the Hanson is correct regarding the fact that no interpretation is added to the state of affairs, it is necessarily the case that, as Allen proposed, there is a partiality, but this partiality does not come with respect to some underlying metaphysics (the cylinder), it comes by way of decomposing the onto-epistemic entities —that is, abstracting away from the totality, and negating some of what is present to the subject— into different possible sets of onto-epistemic entities, no matter how slight the difference. A more detailed account of decomposition (i.e., abstraction)[5] will demonstrate why "emergence" is a mistaken notion, and will also further substantiate the validity of the claim "flat ontology," which is a necessary component of an onto-epistemic classification. Now, this is not something necessarily new, just because a name, "flat ontology," has been appropriated; Dupré has, in a way, argued toward the same end. Dupré has proposed ecology as a case in which entities from three tradition ontological levels of classification (multicellular organisms, single cells, and

[5] The words "decomposition" and "abstraction" are interchangeable, and both are employed for the reason of developing a juxtapositional piece of imagery. In particular, to show that the ground-up view of composition (monism and fundamentalism) that has pervaded the history of science is to be contrasted with the exact opposite, provided by theory-ladenness, "flat ontology," and the onto-epistemic classification; the scientist abstracts downward, away from the phenomenological level, consequently stripping away what is present, by a process called "abstraction."

molecules) present themselves in ecology, where a possible way to go is to simply level the ontology by imposing a single, flat, *proletarius* ontology, where no entity (or set of entities) possesses a privileged status in its role in a scientific explanation (Dupré 326). This prepares the way for a discussion of emergence and the nature of decomposition of onto-epistemic entities.

The picture that one should begin to take away from this is that scientific disciplines take a metaphorical scalpel to the world, the flat ontology, and cuts out of it (abstracts away) what is of pragmatic use. As will be seen in what follows, the bidirectionality of explanation in van Fraassen's account of explanation points to this understanding. Also, this gives a sense of why, when look at the world as gradiated ascending scales, properties seem to magically and inexplicably arise —or, as modern parlance would have it, "emerge." That erroneously-thought-to-be-emerging properties disappear in accounts of goings on at lower levels is not a product of their emerging from some fusion of lower-level interactions, but a product of their being cut from the conceptual space of onto-epistemic entities; and so this must be explained in fuller detail.

How Emergence Doesn't Emerge

In Allen's "The Geometry of Partial Understanding," he quotes Marvin Minsky's 1968 paper, where Minsky says, "We use the term "model" in the following sense: To an observer B, an object A* is a model of an object A to the extent that B can use A* to answer questions that interest him about A" (Minsky 425).[6] There are two contentions to be brought to this

[6] Presently, it shall be shown that the terms of use for the word "model" are much broader than one might traditionally think; and this will be done by demonstrating that onto-epistemic entities, or, if preferred, sets of them, are models.

understanding —and, to be clear, the use of the word "model" will be taken in a broader sense than Minsky meant it, but, it can be argued, this is done without loss of generality; more on this will follow in the Conant and Ashby discussion, later. (In each step of the following, the reader should be aware of allusions to Allen's aforementioned metaphor.) The first is that, supposing that there is another model A** also a model of A, it is the (onto-epistemic) stance of this paper to assert that both $A^* \subset A$ and $A^{**} \subset A$ such that $\{A^*, A^{**}, A^{***}, \ldots, A^{*(n)}\} = A$.[7] That is, any $A^{*(ith)}$ is a subset of conceptions that comprise the entity A. Implicit in this is the originally proposed onto-epistemic argument presented at the beginning of the paper, namely, that an entity is to the subject/scientist only what he or she conceives of it. There are a number of interesting consequences in this set theoretic presentation of the idea of onto-epistemic entities.[8] Being that any A or $A^{*(i)}$ may be partitioned, if some standard of empirical adequacy is met, it is the case that there is no preferred A form. In fact, the only real types of distinctions that can be made are: 1) the relative relation in abstractedness from the entity abstracted, and 2) a phenomenonological distinction (i.e., whether an entity avails itself to the subject in this manner). The contention is that the phenomenological distinction is an erroneous one, in that sense that it does not afford preferential status to a particular class of entities; and this has led many scientists, philosophers of science, and historians of science down a path that argues over the "realness" of entities like quarks. [2] This sort of discussion is contradicted by the point that science has provided a way in which the subject can stand in relation to the world, in a matter that "extends" onto-epistemic

[7] This is the way that the fundamentalist would want it to workout, anyways, but, as will be noted later, this can't quite be the case. An asymmetry is produced by the abstracting away from A, such that a complete composition of all $A^{*(n)}$ can't even be argued for.

[8] To avoid confusion, this is a preferred presentation because this paper is claiming that the phenomenological is that basis for the structural understanding of the world, not the fundamentalist spatial hierarchy. That is, the world is taken, herein, to be a conceptual space that is embedded in a commonsense phenomenology which is to be viewed as a conceptual space, where abstracted aspects of the phenomological plane are transcendent features of it, contingent upon the parsing (scientific methodology). Being a conceptual space, the world may be viewed as onto-epistemic entities (A) and the onto-epistemic entities abstracted away (i.e., subsets, e.g., some $A^{*(i)}$). Furthermore, anything that can be consider a subset is necessarily, in some way, a part of some salient feature of the phenomenal plane.

status to subsets of any particular entity, call it the set of conceptions "A." One sees this sentiment echoed by philosophers, like Ian Hacking, who has notably proclaimed, "[*s*]*o far as I'm concerned, if you can spray them then they are real"* (*Representing and Intervening* 23). Onto-epistemic entities are onto-epistemic entities, and there is no absolute distinction of status that can be brought to sets A and A*. Each is atomic in the sense that both may be handled as unitary wholes, and not in terms of its "components" or its abstracted heritage; and this capacity to treat each onto-epistemic entity as though it is atomic is complemented by the other half of its dual nature, that there is the possibility of decomposition. In a sense, the goal of the remainder of this paper is to use this variety of thinking to demonstrate the fallaciousness of fundamentalism, and demonstrate its problematicity.

Of course, the setup instituted of subsets is misleading, as the fundament of science is the phenomenal plane, not the fundamentalist's small-scale, ascending-size compositional framework. This means that the union of onto-epistemic entities will not directly yield the phenomenological onto-epistemic entity. As James said in his *A Pluralistic Universe*, "The type of union, it is true, is different here from the monistic type of *alleinheit*" (*A Pluralistic Universe* 134). However, while sympathizing with, the current enterprise seeks to go further than Kellert, Longino, and Waters' introduction to *Scientific Pluralism*, in which they only question whether (and leave as "an open, empirical question") there can be a "single, complete, comprehensive account of the natural world based on a single set of fundamental principles" (Kellert, Longino, and Waters x). The reason is that, if the phenomenal plane is to be taken as the basis for rational constructions in a conceptual space, then there is a halting problem: there seems to be no mode by which one can determine whether there exists an exhaustive collection of subsets of any phenomenal onto-epistemic entity. The astute reader will suggest that this does not preclude that

there is a finitude of subsets. However, treatment as such is never possible. What has happened by replacing the physics by the phenomenal world as the starting point for science, is that moved the phenomenal world from being the finite product of finite lower level constitutional components and relations, and made the phenomenal level an ostensibly infinitely divisible flat ontology.

To formally introduce and fully convince the reader in the flatness of this "ontology," it is helpful to consider Allen's meerkats. The view taken by the autonomic camp, A*, and that of the Peircean camp, A**, are such that, even though they are abstractions of A, A*≠A**. Prima facie, this may appear to be commonsense, that the two camps are seeing things differently, so, of course, the set of conceptions are not exactly equal. However, there is something more substantial in this non-equivalence relation. The degree to which A* and A** differ can only be explicitly noted to a degree; so supposing one scientist is going back and forth, working between A* and A**, this scientist will be unsure as to whether her list of differences between the camps is exhaustive.[9] In a sense, there is a decidability problem in the listing of assumptions that underpin the perspective; the completeness of any such list is always in question. In fact, there is some question about whether an individual salient feature (e.g., the meerkats per se) of the system being studied is viewed equivalently by the sets of researchers. This is not an important point that the reader need fully embrace. The point being made is that there is a reason why the onto-epistemic has been referred to as a collections of conception, which are themselves onto-epistemic entities, rather that predicated: Predicates in most logic systems tend to be bivalent in attribution (either they are or they are not), and this is an incorrect characterization,

[9] As will be seen in the pragmatics of explanation, this holds for constituents of differing "levels," as the various interest dependent models and entities from different levels are all constructions of abstracting; that is, ignoring other features of what is at hand, so as to take a metaphorical conceptual scalpel to the phenomenal plane. Just as neither model of the meerkat system (an onto-epistemic entity) enjoys a privileged status, neither should onto-epistemic entities of varying size, complexity, or what have you.

because, by science's capacity for the subject to stand in relation to an entity in a way not previously possible (the introduction/realization of new conceptions about the entity), it is clear that entities are not compositional wholes of collections of atomic predicates, bivalently predicated. Moreover, it is not at all clear whether there is any such kind of predicate discreteness, which, really, hearkens back to Clarke's comments regarding Kuhn, as stated above. All that one can say about the meerkat researchers' collection of conceptions, A* and A**, is that they are not the same, and that there is no way to tell which one has cut away more of what is —that is, one cannot say whether A* or A** has cut out more of A in the abstraction process— nor can they produce an exhaustive list of the negations, conceptions abstracted away. One does get a qualitative feeling for the varying degrees of abstraction in putative entities, A^j and A^k, but there is no absolute measure of abstraction. At any rate, what this amounts to is the fact that it is not quite possible to catalog each $A^{*(n)}$, so as to take the union of all and get A by this composition. This is because there is an asymmetry in the abstraction process, which has been thoroughly noted by Nancy Cartwirght (Cartwright 353-354). If the reader is inclined to feel as though this is commonsense, it isn't, as Steve Clarke's historical explication of the shift from Aristotelian physics to Galilean physics, and has perceptively noted:

> Recent empiricist philosophers of science clearly have not understood laws of nature as being idealizational. If the Galilean revolution in scientific methodology was centered upon the rejection of Aristotelian qualms about the use of idealized laws, then it is stunning that among the mid-twentieth-century empiricist heirs of the Galilean revolution, not only have fundamental explanatory laws of nature not been held to be characteristically idealizational, but also the question of the idealness of the laws has not even been much debated (Clarke 92).

While Clarke uses "idealizational" and "idealization" throughout his text, it has been avoided, here, because it gives a false impression. These words tend to suggest artificiality, in the sense

that an abstraction is a just-for-pretend way of thinking about things, and that the idea was created ex nihilo for the purposes of understanding what actually is the case. Great pains have been taken to associate abstraction with decomposition, and distance it from the artificiality of idealization. A fine example of the problem that arises in confusing abstraction qua decomposition and abstraction qua idealization can be seen in Dupré's discussion of abstraction: "Roughly, it is that strict laws of nature are an abstraction. *Real* classes of objects only approximately accord with such laws" (Dupré 326) (emphasis added). While agreeing with much of what Dupré has to say on the matter, this attitude of withholding "realness" of classes of objects is wrongheaded. The perspective to be advocated is that entities are less like those of the phenomenal plane, because so much of what is at hand has been ignored; the greater the degree of isolation, the more perfect the entity is. With this advocated perspective, it is no wonder that systems of inherently less scrutiny (zoology and neuroscience) seem like such a mess compared to the pristine, highly ordered scientific endeavors of classical mechanics; as less and less is ignored in an onto-epistemic entity, the more and more "noise" one encounters.

Continuing consideration of the proposed non-eqivalence relation, $A^* \cup A^{**} \cup A^{***} \cup \ldots \cup A^{*(n)} \neq A$: Within the (onto-epistemic) stance of this paper, just as in the pragmatic pluralist account, "the multiplicity of approaches that characterizes many areas of scientific investigation does not necessarily constitute a deficiency" (Kellert, Longino, and Waters x). The language of this paper, it should be stressed and clear, can largely subsume the language used by Kellert, Longino, and Waters in *Scientific Pluralism*, except for minor differences on points of metaphysics —as "metaphysics" is an undefined term, within the scope of the present project. Going further with the previously mentioned difference, it begins with the fact that there is an ambiguity in the accounts, like that of Allen's, or in the introduction to *Scientific Pluralism*,

namely, that it is not clear whether the metaphysical "cylinder" exists; and this is problematic, because being metaphysically agnostic is philosophically unsatisfying. This is particularly evident in philosophers' desire to unnecessarily impose a metaphysics on Kuhn's *Structure*.[10] The illustrations of the present pragmatic pluralists is a good start for the scientists, demonstrating that they need not be at one another's throats for conflicting sets of metaphysical bases, but the philosophical issue of metaphysics remains. The difference, then, is not simply to ignore the metaphysics, but to increase the cohesion in accounts by demonstrating that metaphysics is a mistaken notion, which partitioning the onto-epistemic classification creates. It seems that a theory-laden, onto-epistemic position achieves greater internal coherence by removing the ambiguity.

The picture of why and how it is that scientists and philosophers have been under a false impression regarding science as fundamentally compositional and hierarchical: While the subject abstracts away from the phenomenal plane, and given that abstractions tend to either remain on the same size scale or pertain to smaller scales, there is a downward appearance in the abstraction. This is aided by the commonsense experience of compiling an emergent thing out of parts, such as the bringing together of grain, yeast, water (the constituents), and the brick oven (the right conditions); and it is natural to say that *this* (the bread) *is nothing but that* (the constituents combined in the right conditions). Such is the commonsense that fools the mind into thinking similarly when, in reality, particle physics has not been abstracted "downward" —as the scales might illusively suggest—, but that particle physics is the result of cutting away the vast majority of reality in producing such pristine, purified, desiccated, and packaged laws. Having

[10] While claims that abound that Kuhn's *Structure* was anti-realist in bent, one need look no further than the class of comments made by Kuhn, such as "The very ease and rapidity with which astronomers saw new things when looking at old objects with old instruments **may make us wish to say** that, after Copernicus, astronomers lived in a different world" (Kuhn 117) (my emphasis added). In these, phrases like "one may wish to say" clearly denote a hands-off treatment of metaphysics.

previously paid homage to Hacking's thoughts on the reality of entities, it is only right to present the qualification that the is necessary in attaining a fuller, more complete understanding of the situation, that Hacking is in error, when he says: "Debugging is not a matter of theoretically explaining or predicting what is going wrong. It is partly a matter of getting rid of "noise" in the apparatus" (*Experimentation and Scientific Realism* 1158). What he is right about is that "[n]oise often means all the events that are not understood by any theory" (*Experimentation and Scientific Realism* 1158). Even in proceeding to discuss the importance of isolation in the physical system, Hacking's fundamentalism is rife, virtually obstinate in his defiance to acknowledge that the laws of physics are ceteris paribus laws.

From this discussion, it becomes clear why the notion of emergence perpetually floats to the top, becoming a topic of debate: The fundamentalist, compositional view of the world cannot support phenomena that ostensibly arise because of changes in scales or when collections of entities become numerous and their relations complex. However, it seems much more realistic that decomposition (i.e., abstraction) of entities, which cuts out the vast expanse of what is really going, for the sake of creating ceteris paribus laws and parsimoniously conceived entities, means that, by adding everything back up, one cannot arrive at what is seen to be included in the higher "levels." This decomposition process, and subsequent attempt at fusion of entities, is equivalent to the analogy of ripping out every tenth page of a book, and finding, from that small portion of text, that the whole story is not contained in that sample when recombining them. Truth be told, a science like physics tears out far fewer than biology. As the analogy indicates, there may seem like there is a "something more" that is needed to account for the whole, but, rather than the "something more" being introduced by fiat (or somehow by "levels"), serious consideration should be given to the converse: the "something more" does not arise by some compositional

emergence that adds to what is the entities at hand, but that the "something more" was abstracted away, when isolating phenomena (whether phenomenological or not). Though having developed one of the clearest and most explicit accounts of how properties emerge by fusion, an inter-level process (Humphreys 119), Paul Humphreys has admitted the possibility that, if a non-compositional approach to emergence were viable, then levels would not be needed for his fusion idea. More precisely, Humphreys has noted that the ontology, specifically, would need to lack involvement in any kind of remaining composition.[11] It is for this reason that a flat "ontology" that one can begin to do away with "levels"; they simply are not requires when one takes an anti-fundamentalist approach, whereby the properties that would emerge, as viewed by other frameworks, is simply those aspects of entities which are abstracted away, negated, and represent the discarded part of the decomposition.

Further Justification for the Onto-epistemic Stance

The preceding discussion of Kuhn, hopefully, primed the reader to have an eye toward the role of anomalies, when juxtaposing Hacking's elimination of "noise" and the Cartwrightian ceteris paribus laws. Each of Hacking's events, for Kuhn and (perhaps) Bruner and Postman, belong to the group of all anomalies not explicable by theory, yet, anyways. If Kuhn's account is to hold water, then Hacking's position of "just noise" begins to lose its grip, which also means giving a bit more justification to the ceteris-paribus nature of physical laws. Illustrating the connection in these ideas, one is reminded of C. S. Peirce, who wrote:

> [U]niformity is seen to be really a highly exceptional phenomenon. But we pay no attention to irregular relationships, as having no interest for us. We are

[11] This thought, and the preceding, were presented in an email to the author. See works cited.

> brought, then, to this: conformity to law exists only within a limited range of events and even there is not perfect, for an element of pure spontaneity or lawless originality mingles, or at least, must be supposed to mingle, with law everywhere (Peirce 49-50).

If one is to have a philosophy of science that is sufficiently informed by science, the work of cognitive science must be implemented to establish a context for the onto-epistemic stance.[12] In a paper by Stephen Grossberg, one finds that his adaptive resonance theory model, which is particularly useful in understanding cognitive processes of learning, suggests that the mind is structured around the idea of cutting out vast amounts of information that do not fit into pre-established (i.e., empirical) discriminatory patterns, and to cognize such within a range of uncertainty ("Competitive learning" 41). Moreover, there is a vigilance parameter that is consonant with the findings of the Postman-Bruner experiment, in that repeated cycles through the deck with the trick card increased the likelihood of the subject cognizing the trick card, as though feedback adjusted a vigilance parameter ("Competitive learning" 38-39). That is to say that, whatever the specifics, it appears that the way in which cognition allows the subject to encounter anything is fairly well parceled. Keep in mind that this parceling is for all entities, and it is not so much a stretch to think that this is how the brain manages information, keeping fuzzy, atom-like parcels to understand the world.

Another piece of cognitive science literature is Conant and Ashby's paper, demonstrating that every good regulator of a system must be a model of that system. Regarding the already-discussed term "model," which came up in Minsky, this is where "model" comes to mean something definitively more than that. The entirety of the Conant and Ashby paper, "Every

[12] As was stated, the psycho-cognitive tier, itself, will not be much handled in this paper, and avoided if possible. The arguments presented, here, are little more than handwavy, as they are intended to establish the basic superiority of Cartwright's views over Hackings, that is, anti-fundamentalism over fundamentalism. A much stronger line of argumentation could be made for the necessity of the onto-epistemic classification on the purely psycho-cognitive tier; and the primary reason, among many good reasons, for avoiding it is that a treatment to the subconscious would be absolutely necessary. This would take away from the current project of treating and understanding levels.

Good Regulator of a System Must Be a Model of That System," could be quoted, here, were there no matters of length restrictions —just to give the reader a sense of the importance of this paper to the foundational line of thinking maintained herein. Most succinctly, the final line of that paper says a lot: "There can no longer be a question about *whether* the brain models its environment: it must" (Conant and Ashby 97). The adjustment that needs making is merely that, if the subject's world is conceptualized in the approximate cookie-cutter fashion described by Grossberg, as well as theory-laden (which a model-view admits), then the structure of the world is the (theory-laden) mapping of onto-epistemic entities, an interrelated web where changes in onto-epistemic entities can cause local changes or global paradigm changes. This is also corroborated by Grossberg, who notes that, under the appropriate conditions, a single point in an "embedding field" (a conceptual space in which facts are related) can influence the entire field of points, inducing a gestalt effect ("Embedding Fields" 233). In tandem with Hanson's and Kuhn's use of theory-ladenness, it makes sense that changes in the subject's conceptual space can change how those concepts are mapped into the physical (phenomenal) space (e.g., Necker cube).

Bidirectionality of Explanation

Immanuel Kant proposed and, subsequently, tried to resolve, what he called, the antinomy of teleological judgment. He laid out this antinomy in typical Kantian fashion, as follows:

> The *first maxim* of Judgment is the *proposition*: all production of material things and their forms must be judged to be possible according to merely mechanical laws. The *second maxim* is the *counter-proposition*: some products of material nature

> cannot be judged to be possible according to merely mechanical laws (To judge them requires quite a different law of causality, namely, that of final causes) (Kant 179).

Kant, in a way, prefaces this with his first division on the "Critique of Teleological Judgment," where he discusses "purposiveness," which, in short, is the notion that talking about parts is really talking about parts of a whole. Among the points made by Kant was the error of imposing concepts upon an object, then attributing a *nexus finalis* to it, when there was only a *nexus effectivus* (Kant 158). Guyer has noted that much of scholarship has presumed the resolution of the antinomy to reside in the fact that the maxims are regulative, not constitutive (Guyer 346). Hopefully, it is at once clear to the reader that the preceding has eliminated such a distinction, by way of the onto-epistemic stance, and, therefore, introduces a challenge.

The challenge is that, if all onto-epistemic entities are to occupy an equivalent status — that is, all entities may be spoken of with equal privilege on a plane of flat "ontology"—, then explanation must demonstrate no privilege in the direction of complexity or scale, otherwise flatness is undermined. van Fraassen supplies such an account. In his monumental work, *The Scientific Image*, he lays out, what he appropriately calls, "the pragmatics of explanation." In it, van Fraassen presents an account of explanation that admits bidirectionality to any explanatory setup, the direction of any line of explanation being determined by interest-dependence (van Fraassen 132-134). Kant, in the end, privileging Newtonian physics, leaves the matter in an unsatisfying state, almost anticipating a thinker to come a long and give a Humean account of explanation that admits bidirectionality. Such an account appeals to the variegated landscape of phenomena that scientists account for. However, it may go unnoticed that there is no apparent reason to limit the pragmatics of explanation to a single "level"; and if entities from a higher

level may, in one explanation, be causally ordered differently than in another explanation, such implies that entities of the antipodal levels share a singular ontological status.

An interesting misunderstanding on the part of Salmon and Kitcher illustrates why van Fraassen's account is theory-laden. In a paper, "van Fraassen on Explanation," they fail to see how the contrast classes inherently constrain the relevance relation, R, in van Fraassen's chapter on pragmatics of explanation (Kitcher and Salmon 318-319). One does not, in accepting that compounds X and Y possibly acted as catalysts in an admixture, say, "the reaction was caused by the cat walking under the table." The question in van Fraassen's understanding of explanation, $Q=<P_k, X, R>$, is inherently constrained by the theory; that is, one must first have a background theory which differentiates and acknowledges X and Y in order to ask any question about them. The same can be said of all of the other theory associated terms, "catalyst," "reaction," and so on, if one were to take chemistry as an example. As Marx once commented something to the effect that consciousness of precedes language, words arise due conscious distinctions between objects and relations. From this standpoint, P_k constrains the relevance relation such the contrast class includes X and Y, because the theory in place (chemistry) says that these are the most likely candidates of explanation. One should keep the "cat walking under the table," and Kitcher and Salmon's example of astrology (as being the cause of the JFK assassination) in their paper, in mind as doxastic states are discussed, of which these are prime examples.

Distinguishing Doxastic States from Onto-epistemic Entities

After wading through the above, one might be inclined to ask what it is that makes something an onto-epistemic entity, especially, given that the position of the foregoing has been

to affirm the realness of such entities. "Why," one may ask, "isn't a unicorn or a monad an onto-epistemic," the point being that the twenty-first-century mind would deny the reality of both. The answer to this question lies in the fact that not all of what epistemology is, is to be merged with ontology. That is, there are some items that are currently taken to fall under the category of epistemology that really do not fit with the picture that has been constructed so far. Such items are beliefs that reside outside of the two categories that can, in any sense, predicate "realness" to the entity: 1) intervention and manipulation, and 2) theory-laden-derived allocation of entity status and causal attribution. These two categories can be understood in a very commonsense way: An entity becomes real for the subject when she or he acknowledges that there is an active mode of manipulation (Clarke 80-81) or intervention that can be understood to involve an entity; or an entity becomes real for the subject when the theory-laden web of understanding of the world has an explanatory gap, which the entity satisfactorily attenuates, even if never direct or indirectly manipulated or subjected to intervention. These are the criteria of an entity's cash-value. This is nothing new to the traditional pragmatic view (*Pragmatism* 116). For the theory-laden world of today's subjects, monads and unicorns are not a reality.

This pair of criteria leaves one with all of the belief statements that one might think, but that are not a part of and do not correlate to the world's flat ontology, except in the sense that they might be or correlate to brain states. It is the hope of the current presentation that this appeals to the intuition of the reader, as it is the modus operandi by which the scientist —even the layperson— understands his or her world: on the basis of manipulation and intervention, the subject influences outcomes in her or his world; and, in instances where this cannot be directly (on the level of naïve commonsense, informed by the phenomenal plane) or indirectly (through theory-laden means) done, attribution of onto-epistemic status is lent on the basis of available

evidence such that the evidence places the entity adequately within the scope of the theory. That is, the onto-epistemic status is lent on the grounds that it is in line with evidence and fits into a theory, or, if there is no outstanding evidence, somehow completes the theoretical framework. Whatever the case may be, the theoretical framework is extended to the entity that coheres with it, as the former affords the latter a place in the worldview in which subject might understand the world. This account comports well, not just with scientific practice, but also the manner in which the layperson operates in the world, so an explication is worthwhile.

The first criterion is obvious: The notion that a long stick can be used to pry a boulder from in front of a grotto's opening is one graspable by a child. The second criterion is not far removed from the simplicity of the first. One that is camping might find a smoldering pile of logs in the woods, surrounded by a black, char-colored residue, with rocks surrounding the logs. The individual need not ever come across the camper who left the site so for that individual to unproblematically (and with a high degree of certainty) to conclude that it was, in fact, some camper who had ignited a camp fire. Likewise, the scientist, possessing a theoretical account that entails particle physics and spectroscopic analysis, concludes that the source of energy in the sun is nuclear, though no experiment will likely ever been done in the sun, and evidence only ever indirect.

Hopefully clear at this point is that any content of consciousness that is not afforded onto-epistemic status is to be dismissed and classified as merely a "doxastic state," whereas contents based on the subject's extended empirical experience (extended, because of cultural and social transmission of empirical accounts) are onto-epistemic entities. In other words, ideas that are not warranted by the theory-laden worldview are classified as mere doxastic states, and an

affirmative truth-value is withheld. This notion that any old idea not pragmatically fitting into one's worldview cannot be embraced first came in James' *Pragmatism*:

> I said just now that what is better for us to believe is true *unless the belief incidentally clashes with some other vital benefit*… In other words, the greatest enemy of any one of our truths may be the rest of our truths (*Pragmatism* 110).

The approach taken in this paper differs in the sense that, in order to pass muster, being afforded onto-epistemic status, only the entities that are directly manipulated or intervened upon, or passively complete the theory-laden understanding of the world. While believing certain things, that most sane individuals would not, may be psychologically therapeutic, the reason James admitted such, but a theory-laden worldview does not admit these as "true" correlates to things in the world; they are merely doxastic states, having only a fleeting, ethereal, and indefinite relationship to one's understanding of the world. For example, believing, for psychological purposes, that one can walk on air, for the sake of overcoming fears of working at a great height, need not (and must not) abandon her or his theory-laden worldview that she or he cannot walk on air. The thing is that, what has been relegated to the status of "doxastic state," not being a part of the theory-laden world, are those contents about which one can maintain both it and its antithesis, though it makes no difference in the worldview. In other words, on may maintain a belief in the antithesis of some part of the theory-laden worldview, and it would make no difference, because the theory-laden counterpart is an onto-epistemic entity (the property that air lacks the kind of resistance that affords walking on) and the antithesis (belief in ability to walk on air) is a doxastic state. This does not mean that any doxastic state's antithesis is naturally a part of any given present's worldview.

This brings the discussion to levels, whether based on mechanisms, complexity, apparent spatial composition, or whatever. While these can be *helpful* to any given instance of

illustrating a linear explanation, the levels will be determined to the interest-dependence that gives rise to the salient features. However, helpfulness, contra the traditional pragmatist's thinking, does not concretize an idea, assigning it the status of onto-epistemic entity. One only needs to take stock of current accounts that involve levels to see that, based on the setup, levels are doxastic in nature. Levels, for one, do no work in explanation. Instead, levels provide a helpful way of thinking about how the conceptual space maps onto physical space, and the compositional view that avails itself on the phenomenological level (the cake metaphor from above) is the model by which the scientist structures this mapping of the conceptual space onto physical space. This is a very natural, commonsense way to organize the way one thinks about the world, but it is no more a part of the (onto-epistemic theory-laden) world than eggs, flour, sugar, and milk constitute a level and a cake another. This is reflected in accounts of levels, such as Carl F. Craver's account where he notes that there is absolutely no reason (other than the salient features of the interest-dependent matters at hand) to break levels up one way or telescope them. He says, in his exploration of the explanation of long-term memory, "[m]y decision to break this explanation into four levels is surely an oversimplification" (Craver 169). Yet he proceeds in a manner that is completely acceptable to the pharmacologist that might be interested in what (NMDA receptor) he or she might be able to manipulate with pharmaceuticals for the sake of betterment of long-term memory.

Conclusion

To sum up, a number of things happen when one begins to embrace the above discussed notions that naturally fit so well with one another. Aside from a self-affirming web, it seems

difficult to look at the bidirectionality of explanation while preserving the status of entities in any explanation, especially when there is no pragmatic criterion that denotes any difference between them. In separating out the contents of what is currently accepted to be "epistemology," they a divvied up on the basis of the given pragmatic criteria into onto-epistemic entities and doxastic states. It is this division that relegates levels to a status of fiction, by way of impotence of explanatory efficacy; levels do no work in an explanation, and cannot be intervened or manipulated, and only arise for the reasons of: 1) simplifying the causal thicket; 2) providing a monistic, fundamentalist structure to the world, employed because the idea of "levels" is a seemingly commonsense notion, if not *a priori* and ontologically unjustified pretext; and 3) the failure to separate items of epistemology of cash-value from those that have none, and distinguishing ontological status on this basis.

End Notes:

[1] While citing Manuel DeLanda and borrowing a very specific piece of his corpus, it should be clear that the employment of this idea will not require any of the peripheral conceptual baggage that DeLanda encumbers himself with; and a quick perusal of his work's commitments, contra this paper's commitments, demonstrates this disjunction. Moreover, as the following in-body texts shows, the idea of emergence, also, doesn't carry over into the line of reasoning presented in this paper.

[2] Though well beyond the scope of this paper, there are implications as to how the history of science is to be handle, particularly, the nature of the entities extant within the worldview of any given time.

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