Cognition as Negation

In what follows, an approach to cognition will be developed on the basis of an idea that was originally developed for the sake of handling an issue in the problem of the unity of science. The general idea that will be developed is that perception and other cognitive faculties are the product of "abstraction," in the sense that measurement omissions occur so as to eliminate, what could be, an "infinitude" of information. The use of "abstraction" will be clear once the foundational idea of this paper has been explicated. This idea is, what will be called, "the onto-epistemic stance." The structure of the present work will begin with a summary of the onto-epistemic stance, then, explain how this stance naturally leads to a conception of perception that is internally coherent and is in agreement with many commonly held beliefs in cognitive science, and, then, illustrate how useful the philosophy might be in a variety of fields dealing with cognition. On the last point, the treatment will be merely superficial. Of particular interest is the fact that the present project finds its beginnings in a general philosophy of science that combines theory-ladenness, a notion of a merged epistemology and ontology, and pragmatism. Collectively, this provides a "flat ontology," which is meant in the sense that all parts and wholes availed to the subject are of equivalent ontological status, whether one is talking about phenomenal content (e.g., objects partitioned from the backdrop of the phenomenal field, thus possessing salience), language, abstract representations, or any manifestation that is derived from the phenomenal plane (all of the senses, not just visual) by way of some kind of measurement omission.

Developing the Onto-epistemic Stance

In an unpublished paper, which deals with explaining why levels of explanation in the (dis)unity of science debate are a mistaken notion and mere illusion, it is proposed that epistemology has been erroneously separated from ontology.[1] Furthermore, this epistemology, the proper form of epistemology, is then conflated and mixed with types of belief statements that make the branch of epistemology in philosophy a thorough mess. The project suggested, and which may prove helpful to many areas of cognitive science, is to merge epistemology and ontology —and, later, the clarificatory qualification regarding said belief statements will complete the discussion of proper merging of ontology and epistemology. The way to do this is by, first, acknowledging the strong web that is created by combining theory-ladenness and pragmatism, which are harmonized by van Fraassen's account of explanation, the "pragmatics of explanation."[2] One of the issues existing in scientific explanation is that there seem to be as many different breakdowns of levels as there are explanations. Levels of size, ranging from the microscopic to macroscopic, sometimes vice versa, is among the most popular versions of schematizing an explanation; levels of complexity are also popular; and there is a myriad of other kinds of level schemes, including levels of mechanism —all of which are essential to debate over reductionism and kinds of reduction. This zoo of levels has required across the special sciences has required the genius of numerous scholars to attempt reconcile all of these modes of decomposing scientific explanation, only to leave unsatisfying, tenuous pictures of unification (or de-unification) of the sciences. The additional wrinkle of bidirectionality of explanation among levels, as pointed out by van Fraassen, adds to the curious nature of levels of

[1] David Milliern, December 18, 2012, "Flat Ontology and the Onto-epistemic Stance," *Milliern Blog*, http://milliern.wordpress.com/2012/12/18/flat-ontology-and-the-onto-epistemic-stance/.
[2] Bas C. van Fraassen, *The Scientific Image* (New York: Clarendon, 1980), 97–157.

explanation (e.g., the large scale, in the form environmental factors, can alter the mood of a subject, inducing an effect at the level of the subject qua person, while pharmaceuticals, at the molecular size scale, might alter the mood from the opposite scale as the environment). Kant's antinomy of teleology places into greater focus the immediacy of van Fraassen's point, as it shows that there is some confusion, within a single explanation, as to whether the parts or the whole is causally efficacious. In Kant's words:

> 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).[3]

The point of the preceding is to make the first step toward illustrating that it is reasonable to assume that the world is ontologically flat: parts have an ontological status such that they can causally induce effects upon the whole, and, conversely, the whole can causally induce effects in the parts. It is from this flatness that, under the present approach of philosophy of science in handling levels of explanation, philosophers have come to posit such oddities as "weak emergence."[4] Moreover, ideas like emergence, which try to predicate the totality of larger scale structures upon a monistic fundamentalist frameworks —"fundamentalist" in the sense that Cartwright uses it[5]—, proceed under the auspices of a rather hubristic view, namely, that every science *is nothing but* physics. This is a view that has produced more problems than it has solved.

[3] Immanuel Kant, *Critique of Judgment*, trans. J. H. Bernard, ed. Marc Lucht, (New York: Barnes and Noble, 2005), 179.
[4] Mark A. Bedau and Paul Humphreys, ed., *Emergence: Contemporary Readings in Philosophy and Science* (New York: Bradford Books, 2008).
[5] Nancy Cartwright, *The Dappled World: A Study of the Boundaries of Science* (New York: Cambridge University Press, 2005), 23–34.

What van Fraassen's bidirectionality of explanation seems to suggest is that there is no preferred status of any salient feature in the K, the context of knowledge. This is due to the salient features that provide an answer to some question, Q, might have to be organized in a particular way for one Q, going from atoms to molecules, and organized in the opposite fashion for some other question, Q′ (or, realistically, with a few additions), flipping the organization and explaining downward to the molecules and, then, atoms. The direction is pragmatic. It shall be shown that this sort of thinking on van Fraassen's account is necessarily theory-laden, as well. This can be understood most clearly in Salmon and Kitcher's protestation to van Fraassen's pragmatics of explanation, saying that there is no constraint on the relevance relation that determines a satisfactory response to some Q.[6] The issue is that they fail to see how contrast classes inherently constrain van Fraassen's complementary relevance relation, R. 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 (K) which differentiates and acknowledges X and Y in order to ask any question about them: their salience, distinction and relation precede one's capacity to ask a 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. 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," along with Kitcher and Salmon's example of

[6] Philip Kitcher and Wesley Salmon, "van Fraassen on Explanation," *The Journal of Philosophy* 84, 6 (1987): 318-319.

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.

There is an issue that arises here, thanks to the astrology and cat under the table, namely, that there are infinitely many possibly non-explanatory and wholly irrelevant beliefs one might have in answer to a given question. Such beliefs lie outside of what theory permits. The work that this understanding does for the whole of this philosophy is that it delineates between these doxastic states qua oddities and the entities that fit into a theory-laden world, the world as understood by the subject. Therefore, what is taken to be "epistemology," in the classical philosophic tradition, is to be split into doxastic states and "onto-epistemic entities." This latter distinction makes quite a bit more sense when one acknowledges that entities in the world are understood only *as such* or *as if*. That is, anything known about the world, in the sense of science or whether more broadly construed, is understood in terms of how a salient feature fits into the global context of theoretical relations. This is why and how any endless numbers of coextensive phenomena are brushed away in an instant by the scientist in the laboratory or the average person in everyday capacities. Without such a theory-laden context, one might propose anything, that some bizarre belief is grounded in the world, thus lending cash value to anything. One natural point of confusion is going to be the pragmatism of William James, who maintained that belief in such-and-such was justified, if it yielded some positive effect. This does not mean that this hypothetical such-and-such is grounded in the world. James was speaking on behalf of psychology. For example, believing, for psychological purposes, that one can walk on air, for the sake of overcoming fears of working at a great height, a person 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, one 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.

What all of this yields is a flat ontology, which, though it goes beyond Manuel DeLanda's instantiation, DeLanda describes as follows:

> …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).[7]

The interposed of the bracketed "strings, quarks, baryons" is to indicate the manner in which DeLanda's flat ontology is being extended to the current picture. It follows naturally that the pragmatics of explanation account should place all functional components of an explanation on the same ontological and conceptual level, regardless of physical size or whatever hierarchy one may want to consider. This flat ontology provides a web onto-epistemic entities that are interconnected by the nature of their theory-ladenness; however, stopping at that is not quite correct, because the onto-epistemic entities are their own theory-ladenness, in that one understands an entity, whatever it may be, in terms of the totality of the ways it may be thought of, interactions, capacities in various situations, etc. As may be the intuition of the astute reader, a break from van Fraassen's opinion beyond the pragmatics of explanation stands at the fore.

[7] Manuel DeLanda, *Intensive Science and Virtual Philosophy* (New York: Continuum, 2005), 58.

Like can Fraassen, it is maintained that the phenomenological level, the immediate realm of empiricism, is the basis for all scientific understanding; it is what the scientist relies on to stand in relation to some phenomenon; but, just as some theory is required to apprehend phenomenal goings-on, so, too, do theory-laden instruments that extend into the unobservable realm, thus the onto-epistemic stance lends the same kind of ontological status to atoms as it does a soccer ball. This point is important, because it is where the journey with van Fraassen ends, and one looks to Cartwright, Dupré, and Steve Clarke for an understanding of how salient features beyond the phenomenal plane come to be. Once this is in place, the discussion of cognitive science can begin.

While there seems to be subtle disagreement between Cartwright and Dupré, they really are on the same track. Cartwright believes that the physicist, for example, for example, abstracts away "inconvenient features" of the real world to produce schematics, and Dupré maintains that there is that there is something not quite real going on, as particulars are idealized.[89] Though essentially siding with Cartwright, one should presume that Dupré is being dismissed wholesale. Instead, he seems to have the right idea, but comes at the issue in a way that isn't quite effective across the board. The idea that the scientist takes a metaphoric conceptual scalpel to the world and partitions it —every theory-laden experimental approach parsing out and isolating some facet of the world— is precisely the kind of imagery one should have of what the scientist does to the flat ontology of onto-epistemic entities. In this manner of cutting out pieces of the world, where the phenomenal plane is the basis, and not the fundamentalist view that the phenomenal plane is comprised of constitutive quarks (or whatever), the problems of emergence goes away,

[8] Nancy Cartwright. "Capacities and Abstractions." in *Scientific Explanation*, ed. Philip Kitcher and Wesley C. Salmon. Minneapolis: University of Minnesota Press, (1988): 353-354.
[9] Dupré, John. "The Disunity of Science." *Mind* 92, 367 (1983): 326.

because it is not from the basis of atoms that one should hope and try to explain psychological illness or national revolutions; instead, is by way of ignoring the rich and robust plenum of reality, focusing in on the minutest of idiosyncrasies in phenomena that one can isolate that is to be understood as such things as electrons and molecules. The converse is equivalent to trying to rip out a steering wheel from a car and some spark plugs, then trying to figure out how the rest of the functional unit of the car emerges from them. What's more, this metaphor still fails to capture the fact that salient features of the phenomenal plane are, themselves, salient on the basis of recognition, which, herein, is another kind of partitioning as abstraction, qua conceptual scalpel. Before entering into this, which is properly situated in cognitive science, especially theories of perception, further support should be given as to why this particular philosophy of science accords so well with cognitive science, in general.

The Cognitive Basis for the Onto-Epistemic Stance

The preceding discussion of theory-ladenness may have brought Kuhn (and Hanson) to mind, primed the reader to have an eye toward the role of anomalies in experiment, when juxtaposing something like Hacking's elimination of "noise" and the Cartwrightian ceteris paribus laws.[10] 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:

[10] Ian Hacking. "Experimentation and Scientific Realism." in *Philosophy of Science: The Central Issues*, ed. Martin Curd and J. A. Cover. New York: W. W. Norton and Co., (1998): 1158.

> [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 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.[11]

This line of thinking, in a way, brings the set of ideas in the onto-epistemic stance full circle: abstracting means cutting out all of the inconvenient features of all that is available, instantiating sets of entities that are known only insofar as they have a place in a theory-laden phenomenal world. Might this not be the way that all cognition works? After all, Kuhn was uncertain and unwilling to commit to a position on the marvelous and almost unbelievable applicability of the Postman-Bruner result, 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."[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.[13] 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.[14] 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. One of the ways in which it seem correct and useful to extend this kind of thinking is

[11] Charles Sanders Peirce. "A Guess at the Riddle." in *Pragmatism: A Reader*, ed. Louis Menand. New York: Vintage Books, (1997): 49-50.
[12] Thomas S. Kuhn, *The Structure of Scientific Revolutions*, 3rd edition (Cambridge: Harvard University Press, 1996), 64.
[13] Stephen Grossberg, "Competitive Learning," *Cognitive Science* 11 (1987): 41.
[14] Grossberg, "Competitive Learning," 38-39.

to acknowledge (or simply suppose, if the reader is not convinced) that the mind performs this parceling all entities, whether the entity is phenomenal, linguistic, or some other brand of cognitive content. It should be clear to the reader that the aforementioned parceling is no different than what Cartwright says about abstracting schematics from the phenomenal realm, and, indeed, the reason why she should have gone further to claim that abstractions of abstractions are not "departures from truth," but a different degree of abstraction that is still a contiguous part of a flat ontology.[15] Momentarily, discussion should shift toward "models," after which revisiting and furthering these points.

Another relevant piece of cognitive science literature is Conant and Ashby's paper (discussed after what the onto-epistemic stance means by "model"), demonstrating that every good regulator of a system must be a model of that system. Of what relevance could this be? Thanks to a forthcoming paper by Colin Allen, tentatively entitled "The Partial Geometry of Understanding," he makes clear, through the use of a metaphor, that scientific research projects, which are prima facie at odds need not be, likening each model-dependent approach to views of a cylindrical pipe: one team of scientists may see a square (a top-view of the pipe), while another sees an oblate circle (an angled view of the cross-section); and these need not be incompatible, just because one lacks complete knowledge, namely, that a pipe underpins the existence of both models. While the metaphor of the pipe, itself, is metaphysically unnecessary, and consequently discarded by the onto-epistemic stance, the point is well taken, as such different, seemingly contradictory, models of reality are pragmatically viable for the enquiries of the scientist. Allen looks to Minsky on the use of models, who 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*

[15] Cartwright, "Capacities and Abstractions," 354.

to answer questions that interest him about A."[16] In the flat ontology developed up till now, "model" has an additional and important meaning, in that it includes the totality of what is contained in the theory-laden onto-epistemic entity that is given —"given" in the sense of being manifest in the phenomenal plane. At first glance, this is not impressive, because it is, in one sense, equivalent to saying that a whole is its parts, that a soccer ball is a collection of atoms. However, at second glance, the non-trivial and heterodox component of this assertion is that every abstraction, every parceling of a phenomenal entity is an aspect, a subset of that totality, which is why "idealization" as being apart from reality had to be rejected earlier. Enter Conant and Ashby. The entirety of the Conant and Ashby paper, "Every 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."[17] 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 world-as-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. Grossberg, whose collective corpus seems to ever build off of his previous work or further confirm it, corroborates this, noting that, under the appropriate conditions, a single point in an "embedding field" (a *conceptual space* in which facts

[16] Marvin Minsky. "Matter, Minds, and Models." in *Semantic Information Processing*, ed. Marvin Minsky. Cambridge: MIT Press, (2003): 425.
[17] Roger C. Conant and W. Ross Ashby, "Every Good Regulator of a System Must Be a Model of That System," *International Journal of Systems Science* 1, 2 (1970): 97.

are related) can influence the entire field of points, inducing a gestalt effect.[18] 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.[19] Moreover, aside from being artificially confined to the realm of science, "paradigm" as subject's theory-laden world brings new life and vitality, perhaps even sense, to the word. Indeed, though not being read as seeking metaphysical agnosticism, Kuhn's noncommittal "one may wish to say" comments reflect that this confinement was artificial, for instance, "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" (emphasis added).[20]

What the Onto-epistemic Stance May Have for Cognition

If cognitive operations work in the same fashion as abstraction in science, one could expect a number of things to follow. For one thing, the ages old thinking that there are fixed Platonic forms or Kantian pure concepts will go to the wayside. The reason is that the salient features of the phenomenal world are outlined and cutout of a plenum —the "noise" removed from what has traditionally been called "the given"—, and such is not done with uniform precision. In fact, other cognitive operations beyond perception, such as language and abstruse varieties of thought, may be natural products of seeking further precision. For example, in developing notions of "matter" and "form," ancient Greeks, no doubt, had in mind the kind of

[18] Stephen Grossberg, "Embedding Fields: A Theory of Learning with Psychological Implications," *Journal of Mathematical Psychology* 6 (1969): 233.
[19] Norwood Russell Hanson. "Observation." in *Theories and Observation in Science*, ed. Richard E. Grandy. New York: Ridgeview, (1980).
[20] Kuhn, *The Structure of Scientific Revolutions*, 3rd edition, 117

thinking that, if one were to omit the differences among, say, various spheroids, then one arrives at a universal structure that dwells in the mind; and, consequently, irregularities would have been seen to be a product of the phenomenal stuff that the form inhabits, that is, matter. Here, one sees two levels of abstraction that has been borrowed from the extended Cartwrightian sense: the instantiation of "this" (e.g., soccer ball), salient feature (a phenomenal onto-epistemic entity), partitioning it from the plenum of "noise," and the further abstraction of that, by measurement omission[21], yielding "this sphere," which, while itself is an onto-epistemic entity, is a proper subset of the former.

Likewise, language may be a similar kind of abstraction of a phenomenal onto-epistemic entity (i.e., a recognized object). A concern one may have, here, is that words don't seem to be as definite as a rigorously formulated abstruse concept. While there is no time to develop the answer in this paper, it is addressed in the original unpublished onto-epistemic stance paper, in the section discussing sets. Suffice it to say that the foremost aspect of measurement omission —or any word used in the preceding text (e.g., abstraction, partition, omit, etc.)— is the act of negation. That is, rather than the proposals made in the history of philosophy and the philosophy of mind, which tend to see the cognitive machinery as bringing something new to the world to make sense of it, it may be worth thinking the exact opposite: that understanding the world is done by a continual negation of what is, a process that is performed at varying degrees by various organisms.

The point of measurement omission as simply "negation" is an important one, because there would seem be a number of areas of scientific and philosophical endeavor that would be

[21] Ayn Rand, *Introduction to Objectivist Epistemology*, 2nd Edition. ed Harry Binswanger and Leonard Peikoff (New York: Meridian, 1990), 10–18.

effected: AI, psychology, animal cognition, philosophy of aesthetics, evolution of consciousness, social intellectual history, and philosophies of mind, to name a few. The central reason for these areas to be impacted is that, pace Hegel, the "forms" do change over time, and are not universal, necessary, and certain; but are context dependent, contingent, and, both, a result of natural and social factors —if these last two are equivalent, fine, but they are distinguished just in case. It is at least hopeful that, if organismic cognition can be schematized in this way, then it may be lent to other areas, like AI.

In summary, the onto-epistemic stance permits a view of cognition where its contents are termed "onto-epistemic entities," which are instantiated by abstraction (i.e., negation). Beyond the phenomenal level, "intelligent" cognition is made possible by additional partitioning of "the given" into a further onto-epistemic subsets that constitute an interconnected, theory-laden whole. Borrowing the above-summarized philosophy of science, the onto-epistemic stance may stand as a valuable line of thought, if extended to theories of cognition.