Dewey, Enactivism, and the Qualitative Dimension

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ABSTRACT

This paper takes up the problem of the qualitative dimension from the perspectives of enactivism and John Dewey's pragmatic naturalism. I suggest that the pragmatic naturalism of Dewey, combined with recent work on enactivism, points the way to a new account of the qualitative dimension, beyond the bifurcation of nature into the subjective and objective, or the qualitative and quantitative. The pragmatist-enactivist view I sketch here has both methodological-explanatory and ontological dimensions. Following the work of Francisco Varela and Evan Thompson, I suggest that the qualitative dimension should be explained in experientialist and ecological terms. Following Dewey, I suggest that the ontology of the qualitative dimension should be understood in dynamic, relational, and 'transactional' terms.

> The world in which we immediately live, that in which we strive, succeed, and are defeated is preeminently a qualitative world. What we act for, suffer, and enjoy are things in their qualitative determinations. This world forms the field of characteristic modes of thinking, characteristic in that thought is definitely regulated by qualitative considerations.
>
> John Dewey

> The conviction that motivates the enactive approach is that cognition is not the representation of an independent world by an independent mind, but the enactment of a world and a mind on the basis of a history of embodied action.
>
> Evan Thompson

1. Introduction

As John Dewey states, "The world in which we immediately live, that in which we strive, succeed, and are defeated is preeminently a qualitative world" (Dewey

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1930a/1984, p. 243). Yet, the prevailing scientific image of the world would seem to have no place for the qualitative dimension. What initially appear to be the qualitative aspects or dimensions of the world are really—so the story goes—merely secondary or tertiary qualities, relegated to the subjective domain and thereby no part of the real fabric of the natural world. Indeed, even the classical list of primary qualities is replaced by the mathematical-mechanical concepts of contemporary physical science. This bifurcation between the manifest and scientific images of the world gives rise to a series of 'placement problems', such as how meaning, normativity, value, mentality, or consciousness might 'fit' in the world as understood in the scientific image. Indeed, if Dewey is right that the qualitative world "forms the field of characteristic modes of thinking" and experiencing that constitute our lived experience, our lived world, then the problem of the qualitative dimension is quite fundamental. This paper takes up the problem of the qualitative dimension from the perspectives of enactivism and Dewey's pragmatic naturalism. I suggest that the pragmatic naturalism of Dewey, combined with recent work on enactivism, points the way to a new account of the qualitative dimension, beyond the bifurcation of nature into the subjective and objective, or the qualitative and quantitative. The pragmatist-enactivist view I sketch here has both methodological-explanatory and ontological dimensions. Following the work of Francisco Varela and Evan Thompson, I suggest that the qualitative dimension should be explained in experientialist and ecological terms. Following Dewey, I suggest that the ontology of the qualitative dimension should be understood in dynamic, relational, and 'transactional' terms.

2. Beyond Subjectivism and Objectivism

In his 1930 article, "Qualitative Thought," Dewey formulates the problem of the qualitative dimension. He writes:

> The problem of qualitative objects has influenced metaphysics and epistemology but has not received corresponding attention in logical theory. The propositions significant in physical science are oblivious of qualitative considerations as such; they deal with ″primary qualities″ in distinction from secondary and tertiary; in actual treatment, moreover, these primary qualities are not qualities but relations. Consider the difference between movement as qualitative alteration, and motion as $F=ma$; between stress as involving effort and tension, and as force per unit surface; between the red of the blood issuing from a wound, and red as signifying 400 trillion vibrations per time unit. Metaphysics has been concerned

> with the existential status of qualitative objects as contrasted with those of physical science, while epistemology, having frequently decided that qualities are subjective and psychical, has been concerned with their relation in knowing to the properties of "external" objects defined in non-qualitative terms. (Dewey 1930a/1984, p. 243)

On this way of taking up the problem—a way Dewey rejects—the sciences, which are in the business of studying nature as it is in itself, are properly oblivious to the qualitative dimension. Metaphysics is concerned with the ontological status of qualitative objects as compared with the objects of scientific study, perhaps treating qualitative objects as mere appearances or attempting some kind of explanatory reduction to the acceptable objects of the scientific image. Epistemology and related fields are concerned with the actual and possible cognitive relations between the (now merely subjective and mental) qualities of experience and the objective, non-qualitative world.

On Dewey's pragmatic naturalist view, this way of taking up the problem is hopeless. The bifurcation of the world into the objective quantitative-mechanical, on the one hand, and the subjective qualitative-experiential, on the other, is a paradigm case of the philosophical fallacy of intellectualism. Intellectualism here is the view that, "all experiencing is a mode of knowing, and that all subject-matter, all nature, is, in principle, to be reduced and transformed till it is defined in terms identical with the characteristics presented by refined objects of science and such" (Dewey 1925/1958, p. 28). The fallacy involves the unwarranted privileging of the cognitive over the non-cognitive and pre-cognitive aspects of experience. According to Dewey, "the immediate existence of quality, and of dominant and pervasive quality, is the background, the point of departure, and the regulative principle of all thinking" (Dewey 1930a/1984, pp. 261). However, in the course of inquiry, in order to gain a better grip on our cognitive objects, we may *selectively abstract* certain features of the objects within the concrete context of inquiry, for the purposes of modeling, for instance. These features may be the relatively stable, intersubjectively available, quantifiable, or readily manipulable features of objects. In this process of selective abstraction and objectification, we necessarily ignore or de-emphasize other features of the objects and their context. The fallacy of intellectualism occurs when we reify the selected features, and ignore, deny, or treat as merely subjective the other features of the objects or context of inquiry. We may, for instance, abstract away from the qualitative features of perceptual objects and

focus on their quantitative or structural features. We might then treat the latter as really real, and the former as merely subjective.

On Dewey's view, this move unduly ignores the non-cognitive and pre-cognitive modes of experience and aspects of the experienced world which are phenomenologically and methodologically prior to cognitive modes of experience, and without which objective cognitive inquiry is impossible. He writes:

> Thought which denies the existential reality of qualitative things is therefore bound to end in self-contradiction and in denying itself. "Scientific" thinking, that expressed in physical science, never gets away from qualitative existence. Directly, it always has its own qualitative background; indirectly, it has that of the world in which the ordinary experience of the common man is lived. Failure to recognize this fact is the source of a large part of the artificial problems and fallacies that infect our theory of knowledge and our metaphysics, or theories of existence. (Dewey 1930a/1984, pp. 261-262)

Hence, for Dewey and other pragmatic naturalists, the scientific image is not an image of reality as it is in itself (whatever that might mean), but rather an abstraction from and objectification of certain features of nature and experience. It is a difficult and immense achievement. Yet nature shows itself to us through other modes of experience as well: sensory, affective, practical, moral, aesthetic, and so on. The puzzle of the qualitative dimension, then, arises from a deep-seated intellectualism and its concomitant bifurcation of reality into the (really) objective and the (merely) subjective.

There are three basic ways in which Dewey's pragmatic or humanistic naturalism differs from the above picture. First, the qualitative dimension is pre-cognitive. Cognitive inquiry presupposes a more primary experience of the qualitative aspects of the situation or context of inquiry. Moreover, cognitive objects are selective abstractions from the qualitative situation. "By 'object' is meant," Dewey writes, "some element in the complex whole [situation] that is defined in abstraction from the whole of which it is a distinction" (Dewey 1930a/1984, p. 246). This view differs from classical empiricism in two important respects. For Dewey, the qualities of the experiential situation are *felt, had,* or *undergone*, but not necessarily *known.* Qualities are directly experienced, but unlike sense data, they are not given cognitively and they are not epistemic intermediaries between the experiencer and the world. The qualitative dimension is not a veil of sense data or ideas, behind which lurks reality in itself. Rather, the qualitative dimension is how the world *shows itself*

qualitatively in and through engagement by sentient organisms. Furthermore, objects are not constructions out of atomistic sense data, but are rather selective *takings* from within a more holistic experiential situation. In short, we do not first know sense data and then construct objects. We are always situated within a qualitative context from which we abstract cognitive objects.[1]

Second, qualities and the qualitative dimension are not fundamentally mental as opposed to physical, or subjective as opposed to objective. As Dewey writes, "The qualities never were 'in' the organism: they always were qualities of interactions in which both extra-organic things and organisms partake . . . they are as much qualities of the things engaged as of the organism" (Dewey 1925/1958, p. 259). Qualities emerge from ongoing organism-environment transactions, and their proper locus is the *situation.* A situation here is 'an environing experienced world', the overall experiential context or background within which more particular objects, properties, relations, or possibilities are given. Situations will be individuated in part by the actions and goals of the organism, as well as by what the environment affords. Qualities, then, are first and foremost features of total situations, rather than being 'in' the organism or 'in' the environment independently of the organism.[2] On Dewey's view, distinctions between subjective and objective, or mental and physical are drawn *within* situations and can be drawn differently for different purposes. These categories reflect different ways of making sense of, of getting a grip on, complex contexts and should not be seen as reflecting ontological dualities.

Third, situations are characterized by primary, secondary, and tertiary qualities. Indeed, the tertiary or pervasive quality of the situation accounts for its phenomenological unity as a situation. The situation is a "complex existence that is held together in spite of its internal complexity by the fact that it is dominated and characterized throughout by a single quality" (Dewey 1930a/1984, p. 246). For example, if I am hiking in the backcountry and come across a rattlesnake, I have entered a fearful situation. The sense of fear-danger-caution constitutes the phenomenological unity of the situation, its overall qualitative gestalt. The pervasive quality also governs the transformed sense of perceptual and actional salience. The snake—its sound, movement, tension, relative distance—dominates my perceptual field. My peripheral and bodily sense of routes away from or around the snake replace my fluid sense of moving

[1] This selective abstraction paradigmatically involves sensory-motor interaction and exploratory inference.

[2] The question of non-experiential qualities will be addressed below.

with and through the terrain enjoyed a moment ago. My habitual pause and slow movement, so as not to agitate the snake, replaces my earlier hiker's gait. Each of these features, including their rich qualitative features, is evoked and organized by the pervasive quality of the situation.

For Dewey, then, the field of experiencing-experienced is a single situation unified by a pervasive quality. Indeed the qualitative dimension is the primary tissue of the situation. It is directly experienced, but not necessarily cognitively articulated. It is complex in that it involves what, in subsequent analysis we may term sensory, practical, affective, actual, possible and temporal dimensions. Yet, the qualitative dimension of the situation is only ever pragmatically divided into mental and physical, subject and object. At bottom the qualitative dimension is neither subjective nor objective, but transactional. Dewey, of course, had much to say about the transactional basis of experience, but for a transactional analysis that engages with current work in philosophy and cognitive science, it is to enactivism that we should turn.

3. Enactivism and Color

The enactivist approach to color and color vision provides an excellent example of a rigorously transanctional account of this aspect of the qualitative dimension.[3] According to the enactivist approach, despite significant advances in the science of color vision, the question of the ontology of color is still trapped in the problem space of objectivism versus subjectivism. The objectivist holds that color can be identified with certain perceiver independent properties such as surface spectral reflectance or a specific wavelength of light reflected from an object. Recent work has combined a computational explanation of color vision with objectivism about color, a position Evan Thompson calls *computational objectivism* (Thompson 1995). In contrast, the subjectivist holds that color is in some way strongly perceiver-dependent. One might hold the Lockean view that colors are dispositions of objects to cause color sensations in normal observers. Or, one might hold the more radically subjectivist view that colors are projected onto a colorless world by the perceiver. This projectivist view has recently been combined with a neurophysiological account of color vision to yield what Thompson calls *neurophysiological subjectivism.* Yet, on the enactivist view, neither objectivism nor subjectivism provides an adequate philosophical or

3. I take the terms 'enactive' and 'enaction' to correspond quite closely to what Dewey meant by 'transactional' and 'transaction'.

scientific account of color or color vision. Like Deweyan pragmatic naturalism, enactivism seeks to move beyond the subjectivist-objectivist dichotomy. Thus the enactive account is *experientialist*, *contra* objectivism, and *ecological*, *contra* subjectivism.

One motivation for computational objectivism is the observation that color vision is biologically pervasive—it is found in invertebrates, non-mammalian vertebrates, and mammals, for instance. Thus, it is reasonable to think that it evolved as a way of detecting and tracking certain objective properties of the physical environment. Now, since the objectivist about color seeks to identify colors with perceiver-independent physical properties, the central task of an objectivist account of color vision is to explain the link between these objective properties and the phenomenal colors we perceive things to have. How is it that distal physical property X looks *yellow* to perceivers like us? Further, how do perceivers track or detect property X in color perception? And what is the proper mapping between the objective physical features (e.g., surface spectral reflectance) and the features of experienced color such as saturation, brightness, and hue? In order to develop answers to these questions, the objectivist must make a distinction between objective color and perceived or experienced color. The problem, however, is that there does not seem to be any objective mapping from distal physical properties like surface reflectance to phenomenal color qualities sufficient to ground objectivism. As Thompson argues:

> In its first and foremost sense 'color' applies to what is seen in color vision, namely, objects having particular determinate qualities that belong to the hue categories red, green, yellow, blue. Now if, despite there being no perceiver-independent, physical account of color in this sense, it is nonetheless held that the content of color perception is distal in the way that [the objectivists] suppose, then it follows that red, green, yellow, and blue do not provide the perceptual content of color vision. This consequence is simply unacceptable. (Thompson 1995, p. 132)

Note that Thompson here is, in effect, accusing the objectivist of committing the fallacy of intellectualism, whereby the subject-matter, color, is, "reduced and transformed till it is defined in terms identical with the characteristics presented by refined objects of science and such" (Dewey 1925/1958, p. 28). By attempting to account for color and color perception purely in terms of distal spectral reflectance, the objectivist divorces color from the qualitative dimension. And once divorced, there is no objective mapping between the perceiver-independent domain and the structure and qualities of phenomenal

color space. Our basic concept of color is grounded in and arises out of our qualitative experience of the world as colored. It is the qualitative dimension that, to use Dewey's term, 'regulates' our deployment of color concepts. Hence, on the enactivist account, color should not be understood in terms of strictly objective distal physical properties. Rather, "the concept of color applies to spectral reflectance only because there are perceivers for whom reflectances fall into metameric equivalence classes corresponding to red, green, yellow, and blue" (Thompson 1995, p. 201).

So if objectivism about color fails, then, on the usual understanding of the problem-space, some form of subjectivism is the only remaining option. If colors aren't objectively 'out there' independent of the perceiver, then they must be really 'in the head'. According to neurophysiological subjectivism, there aren't really any colors in the world. Colors are projected onto a colorless world by perceivers. This view is, therefore, ontologically eliminativist about colors. On the other hand, there are in fact color *experiences*. The neuro-subjectivist, then, gives a reductionist account of color experiences. That is, extradermal properties do not explain the qualitative and structural features of phenomenal color space, but neural features of the visual system do. Therefore, nothing distal is required to explain color experience and we should treat colors as projections of the visual system.

There are at least two basic ways to challenge this view. First, one may question, either on empirical-explanatory or ontological grounds, the reduction of the phenomenal to the neural. Both pragmatic naturalists and enactivists tend to be non-reductionist about phenomenal experience. However, it is the second way to challenge subjectivism that is important here, namely, that *ecological* factors are needed to account for color vision. Thus, enactivists deny that extradermal factors are irrelevant to an account of color and color vision. On the enactivist approach, "These phenomena are ecological in the broadest sense; that is, they encompass not only the extradermal world as an animal environment, but also perceiving animals as both assemblies of sensory-motor networks and as organismic unities that *shape the extradermal world into an environment in their interactions*" (Thompson, Palacios, and Varela 1992, p. 391). For instance, bees have trichromatic vision that is especially sensitive to ultraviolet. A number of researchers have argued that these features of the bee visual system co-evolved with flowers, which often display contrasting patterns in the ultraviolet spectrum. The mutually advantageous evolutionary and ecological relationships between flowers and bees, "seems to have determined

co-evolution of plant features and sensory-neural capacities in bees" (Thompson, Palacios, and Varela 1992, p. 392).

In short, the enactivist approach to color and color vision is experientialist in that color cannot be understood in a purely perceiver-independent way. The phenomenal color space depends crucially on features of the organisms' sensory-motor systems, for instance. Moreover, color is fundamentally qualitative and cannot be reductively explained in terms of non-qualitative properties. Thus objectivism should be rejected. On the other hand, color and color vision can only be fully understood in terms of organism-environment (including organism-organism) transaction over time, including complex patterns of co-evolution. Thus, subjectivism should be rejected. On the enactive or ecological experientialist approach, color is neither purely subjective nor purely objective. Rather, it is a relational and *ecological* feature of on-going organism-environment systems. To paraphrase Dewey, colors were never *in* the organism, nor in perceiver-independent objects, but are qualities of the interactions between organism and environment.

4. The Co-Emergence of Organism and Environment

On the pragmatist-enactivist account I have sketched so far, there are three key features of qualities and the qualitative dimension. First, qualities are fundamentally relational. Yet, unlike the Lockean view of secondary qualities, they need not be merely dispositional. Colors, for example, are both relational and occurrent. Second, qualities arise from or in the course of interaction between sentient organisms and their environment—they are enacted—but they also guide and constrain those interactions. Third, the qualitative dimension is a multifaceted relational domain or field. It has an integrated structure and the unity of the qualitative dimension in any given situation is aesthetic, affective, and practical. At the heart of this account is the transactional or enactive account of the organism-environment relation.

For Dewey, as for the enactivists,

> The structure of whatever is had by way of immediate qualitative presences is found in the recurrent modes of interaction taking place between what we term organism, on one side, and environment, on the other. This interaction is the primary fact, and it constitutes a trans-action. Only by analysis and selective abstraction can we differentiate the actual occurrence into two factors, one called organism and the other, environment. (Dewey 1930b/1984, p. 220)

The pragmatist-enactivist view, then, rejects accounts of the qualitative dimension based on 'projection' as in the case of subjectivism, or 'recovery' (or 'mirroring') as in the case of objectivism. Rather, the primary process by which the qualitative dimension emerges and the primary basis for its structure is organism-environment transaction or enaction. Transaction, here, goes beyond mere interaction. An interaction can occur between independently specifiable entities. In contrast, a transaction, in Dewey's technical sense, occurs between mutually specifying and co-determining (sub-) systems. In this case, organism and environment are co-determining in a number of respects. The structure of the physical world shapes and constrains the activity of the organism. Yet, through its interactions with the world, the organism carves out or enacts an environment or *Umwelt*, the salient surroundings of the organism. The sentient organism must take up the signals the environment affords, but the significance of these signals depends on the organism's own structure and capacities. And, of course, the activity of organisms changes their environment, which in turn changes the environmental constraints they must face. As we have seen in the case of color vision, on a transactional view, the world of color arises from the on-going process of animal-environment co-determination. Animals select certain properties of the world relative to their own structure as part of the process of constructing a perceptually salient and behaviorally significant environment. In turn, environments constrain the activity of animals and even select for certain sensory-motor capacities, as in the case of bees discussed in the previous section.

So the pragmatist-enactivist understands the emergence of the qualitative dimension in broadly transactional and ecological terms. Yet, it is crucial to see that a transactional account of the qualitative must also be an *experiential* account. The view under consideration here is not simply a more holistic and ecological form of objectivism. The qualitative dimension is not ontologically independent of the lived experience of sentient organisms.[4] Rather, lived experience and the qualitative dimension are transactionally co-determining. For Dewey, the term 'experience' precisely refers to the ongoing and co-constituting (sensory, motor, affective, behavioral, cognitive) transaction between sentient organisms and their "preeminently qualitative" world. In enactivist terms, what is needed is an account of the qualitative dimension in

[4] Here I am restricting the discussion to secondary and tertiary qualities. I discuss primary qualities in section five.

terms of *sense-making*. Indeed, on the pragmatist-enactivist account, *experience is sense-making*.[5]

According to Thompson:

> Sense-making is threefold: (1) sensibility as openness to the environment (intentionality as openness); (2) significance as positive or negative valence of environmental conditions relative to the norms of the living being (intentionality as passive synthesis– passivity, receptivity, and affect); and (3) the direction or orientation the living being adopts in response to significance and valence (intentionality as protentional and teleological). (Thompson 2011, p. 119)

The emergence of an autonomous (i.e., organizationally and operationally closed) organism entails the emergence of a field of possible interactions between that organism and the larger environment. Some interactions will allow the organism to continue and even thrive, while others can harm or kill it. Thus the environment takes on significance and valence: some events are dangerous for the organism, some things are food, and so on. Thus what *we* label the organism's physical surroundings becomes for *it* an environment, a relational domain of significance and valence. Moreover, the overall state of the organism-environment system at a given point is the organism's situation, in Dewey's sense of the term.[6]

Co-emergent with sentient and mobile beings is a sensory-motor world, which in turn shapes the on-going dynamics, structure, and viability of the organism. To be alive is to come into being in the midst of this circular process. To remain alive entails making sense of (i.e., acting appropriately in relation to) the significance and valence of one's world. Thus the organism engages in sense-making at a variety of levels. First, the very sense of the world will be partly a function of the structure, capacities, and evolutionary history of the organism. Second, sense (significance and valence) is enacted and transformed through the organism's action in the world, for example, in exploration of the sensory-motor environment. Third, the organism makes sense of its world through viable conduct, which is arguably the most primitive form of circumspection or understanding. Overall, we can say that sense-making for the viable organism involves a form of experiential niche construction. And in the case of sentient

[5] It is also worth pointing out here that, for Dewey and other pragmatic naturalists, 'experience' does not entail 'conscious experience'. Conscious experience is a subset of the more inclusive category of experience.

[6] There are, of course, interesting questions as to how situations are individuated and how situations interrelate, but they are beyond the scope of the current work.

beings at least, sense-making necessarily involves what we may call *qualitative niche construction.*

The previous section explored sensory-motor dimension of perception and secondary qualities of color. However, on the pragmatist-enactivist approach experience or sense-making and the correlative qualitative world go beyond the sensory-motor. The second and third forms of sense-making centrally involve the affective, aesthetic, and practical dimensions of experience. On Thompson's view, the second form of sense-making concerns the significance and valence of objects or other environmental features relative to the biological norms of the living being. For instance, an animal may experience a plant or other animal as edible (significance) and attractive (valence), or dangerous and repellent. Dewey called these aspects of objects or situations *meaning* and *value*, and they are his prime examples of tertiary qualities. Further, the primary mode of experiencing these tertiary qualities in sufficiently complex sentient beings is affective or emotional. The grizzly is experienced as dangerous in and through *fear.* Fear, on the pragmatist-enactivist view, is not merely an internal subjective feeling, but a mode of engagement with the (fearful) situation. It discloses the situation as having certain tertiary qualities, and includes a particular action profile, or action-readiness. Hence, there is a close link between the enaction or transactional emergence of significance and valence and the third form of sense-making as (re-) orientation. The organism pursues the edible and attractive and avoids the dangerous and repellent. Affective states such as fear play an important role in orienting or re-orienting the organism as it attempts to maintain viable conduct in changing and precarious conditions.

There is, then, a deep interdependence between perception, emotion, and action in the primary forms of experiencing or sense-making. This is reflected in Dewey's insistence that situations are temporal and teleological, as well as qualitative. That is, a situation is a temporal event or process and involves various possibilities for action—what we now term affordances. Returning to the example from section two, when I encounter the snake on the trail, there is a temporal and practical transition from an easy-going hike, to a dangerous and fearful encounter. My perception and attention are drawn to the snake, and my feeling of fear discloses the snake as dangerous and to be avoided. Perception and emotion work together to ready me for action in response to the situation, and I am cognizant of the various ways I can avoid the snake in the current

situation.[7] Moreover, my experience with similar situations, engrained in habit, allows me to remain relatively calm and move slowly, so as not to provoke the snake. Once I move past the reptile and continue on my way, I have resolved the problematic situation and the overall qualitative character of my hiking experience changes once again. Sense-making and the qualitative dimension co-arise in my on-going perceptual, affective, conative, and cognitive transactions with my environment.

5. Qualities and Nature

So far, the discussion of the qualitative dimension has concerned qualities explicitly tied to the experience of sentient beings. The pragmatist-enactivist account of these qualities is not subjectivist, but *is* experientialist. Yet this raises the question of the relationship between the qualitative dimension and the rest of nature. As discussed in section one, a distinctive feature of the pragmatist-enactivist view is its critique of the usual bifurcation of nature into the subjective and qualitative, as against the objective and quantitative-mechanical. The alternative, then, is an experiential-ecological account of the qualitative dimension. However, if the qualitative dimension is ontologically tied to organisms and their experiential engagement with their environments, then there may still appear to be a bifurcation of nature on the pragmatist-enactivist account. The bifurcation is now between the organic-qualitative and the rest of inorganic nature. And if a bifurcation persists, it may still seem quite mysterious how the qualitative could emerge from the non-qualitative.

In light of this worry, it is important to see that both Dewey and the enactivists are keen to reject any bifurcated account of nature. Dewey's evolutionary liberal naturalism is based on the principle of continuity, according to which emergent features of nature incorporate and build upon more basic features of nature. Indeed, in Dewey's naturalism, categories such as 'matter', 'life', and 'mind' are pragmatic and functional, rather than ontological in the traditional sense, and nature is qualitative all the way down. He writes, "The distinction between physical, psycho-physical, and mental is thus one of levels of increasing complexity and intimacy of interaction among natural events. The idea that matter, life, and mind represent separate kinds of Being is a doctrine

[7] It is also worth noting that the deep interconnection between sensory, motor, and affective aspects of primary experience is mirrored neurologically in the deeply interconnected structure of the limbic system.

that springs . . . from a substantiation of eventual functions" (Dewey 1925/1958, p. 261). Similarly, enactivists advocate not only a naturalized phenomenology, but also a phenomenologized (i.e., non-bifurcated) view of nature. As Thompson puts it,

> The physicalist conception of nature as an objective reduction base for the phenomenal no longer holds sway, and instead nature is reexamined from a phenomenological angle. In this way, we find ourselves needing to use certain concepts . . . [that] cannot be factored into the dichotomous categories of the physical and the phenomenal, or the objective and the subjective. (Thompson 2007, p. 359)

Dewey, of course, rejects the Lockean way of distinguishing primary from secondary qualities. Primary qualities are not absolutely intrinsic qualities behind the veil of secondary qualities. Rather, like secondary and tertiary qualities, primary qualities are relational. They are, at bottom, 'eventual functions' or ways that natural events interact.[8] On Dewey's ontology of relational events, entities will be understood in this broadly functional way. For instance, what it is to be a photon, is to play a certain 'photonic' role in the physical environment. The primary qualities of nature here are those qualities of interacting events that do not depend on the experiential transactions of organisms. A world without sentient beings, for Dewey, would still be a qualitative world. Furthermore, again *contra* Locke, primary qualities are not necessarily hidden from our experience. Sentient beings can encounter the primary qualities of natural events through their transactions with the world. Indeed, the refined tools of scientific inquiry allow us to delve ever deeper into natural systems and their qualities. Yet, it is important to recall that, on Dewey's view, strictly quantitative and mechanical concepts are selective abstractions from the richer world of qualitative nature, even with regard to the inanimate world.

In addition, both enactivism and Dewey's pragmatic naturalism are based on a non-reductive process-relational ontology. Nature here is a dynamic network of relational events and processes. There are no absolute simples, and no level of nature that is the unique locus of causal powers. On this kind of process metaphysics, a system or process will have whatever properties it has, including causal properties, in part due its organization and relations. As new forms of organization develop, so too do new qualities and causal powers. On

[8] This includes various dispositions and propensities as well.

Thompson's view, "Phenomena at all scales are not entities or substances but relatively stable processes, and since processes achieve stability at different levels of complexity, while still interacting with processes at other levels, all are equally real and none has absolute ontological primacy" (Thompson 2007, p. 441). This radical shift to a process ontology has two important implications for understanding the qualitative dimensions of nature. First, according to both Dewey and Thompson, a process-relational ontology allows for a kind of emergence. The 'increasing complexity and intimacy of interaction among natural events', as in the case of the development of biologically autonomous systems, yields novel and irreducible qualities and causal powers. So the pragmatist-enactivist will give a broadly emergentist account of secondary and tertiary qualities. Secondary and tertiary qualities emerge from (and feed back into) the dynamic transactions of organism and environment. Second, as Dewey writes, "All materials of experience are equally real; that is, all are existential; each has a right to be dealt with in terms of its own especial characteristics and its own problems" (Dewey 1929/1960, p. 216). On the process view, nature is relational events or organized processes all the way down and all the way up. And since no one level of nature is absolutely primary, our tools of inquiry should treat the qualities of natural events in ways appropriate to their particular level of organization. For instance, color and color vision, as we have discussed, should be treated experientially and ecologically.

6. Conclusion

The pragmatist-enactivist view I have sketched here is both naturalistic and non-reductive. The 'pre-eminently qualitative world' of our experience is a dynamic, relational domain of natural events, events that are fully real parts of the causal fabric of reality. The qualitative world of our experience arises from and incorporates prior organizational levels of nature, but is also genuinely novel and irreducible to them. All qualities are relational in that they characterize relational events, processes, and systems. Hence categories such as 'subjective', 'objective', 'matter', and 'mind' do not carve reality at the joints, but rather reflect pragmatic and functional modes of making sense of our experience. They are, in Dewey's terms, distinctions not dichotomies. The secondary and tertiary qualities emerge in and through ongoing organism-environment transaction. They are enacted in the sense-making of living systems situated in their complex and precarious world. Indeed, I have suggested that we can see the emergence

of the (secondary and tertiary) qualitative dimension as an experiential and ecological process of qualitative niche construction. Moreover, qualities are not merely epiphenomenal side effects of organism-environment interactions. On the transactional/enactive account, the qualitative dimension shapes the very processes by which it emerges, as in the case of the co-evolution of flower colors and the visual system of bees. A full articulation and defense of this view is far beyond the scope of this article, but it is my contention that the pragmatist-enactivist approach points toward a more adequate account of the qualitative dimension, and perhaps toward a way beyond the bifurcation of nature that still troubles our current worldview.

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