2011

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Recommended Citation
Uskoković, Vuk. "Co-Creation of Experiential Qualities." Pragmatics & Cognition 19.3 (2011): 562–589.
doi: 10.1075/pc.19.3.08usk

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# Co-creation of experiential qualities

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Cognitive sciences have been interminably in search for a consistent philosophical framework for the description of perceptual phenomena. Most of the frameworks in usage today fall in-between the extremes of constructivism and objective realism. However, whereas constructivist cognitive theories face difficulties when attempting to explain the experiential commonality of different cognitive entities, objectivistic theories fail in explaining the active role of the subject in the formation of experiences. This paper undertakes to compare and eventually combine these two major approaches to describing cognitive phenomena. It is argued that constructivist explanations inevitably refer to a 'hidden' ontological source of experience, and that a compromise between the constructivist and realistic standpoints presents a natural basis for understanding cognitive phenomena. A view of all experiences as co-created through an interplay between a constructivist creativity and a realistic source of perceptual stimuli is proposed. A middle ground between the hardly compatible constructivist and objectivistic approaches to experiential realities is proposed from the standpoint of experiential co-creation. Traditionally divided, idealistic and realistic philosophical stances may thus become merged into a single consistent epistemological framework. Many favorable cognitive and psychosomatic consequences may arise from acknowledging the balance between 'inner' and 'outer' creativity proposed by the co-creational thesis.

**Keywords:** Co-creation, cognition, constructivism, epistemology, experiential quality, realism

## 1. What are experiential qualities? A constructivist view

A question that sums up millennia of human wonder over the nature of our experiences offers a neat starting point for our exploratory journey. To start off, we will go back to John Locke's *Essay*, where he proposed that all experiential qualities could be divided into primary and secondary ones (Book II. Chapter VII. Paragraphs 9-10). Whereas primary qualities were said not to depend on the observational perspective, secondary qualities were conceived as subjective and incommensurable from the viewpoints of different observational perspectives. For example, aesthetic forms discovered in the shape, color, texture or sound of an object would correspond to its secondary qualities. Its structural properties, e.g., atomic composition or crystalline order, would, however, correspond to the object's primary qualities. Both standard empiricism and the realistic background of modern science are based on the idea that cognitive subjects are actively involved in the definition of secondary qualities only. The primary ones are, in contrast, considered as existing independently of human observers. Such an assumption is directly related to objective realism, according to which the natural world leaves impressions on cognitive substrates independently of their interpretational and perceptual presuppositions.

George Berkeley, however, extended Locke's ideas and arrived at the conclusion that all natural relationships are *de facto* experientially observed ones, and that the complete mathematical apparatus applied for representing and depicting natural qualities can be derived from the human patterns of abstract reflections (Berkeley 1710). The stream of experiential events does not uniquely predetermine, but simply 'invite' subjects to compose the raw perceptive impulses into recognizable perceptual wholes and their abstract representations. Despite the norms of neutrality and objectivity, scientific re-presentations could, therefore, be regarded as inherently dependent on their experiential origins. Causality, Cartesian coordinates, and all other logical and mathematical forms used to represent physical phenomena are partly human inventions applied in the coordination of our experiences. In that sense, Henri Poincaré observed that "geometrical axioms are neither synthetic *a priori* intuitions nor experimental facts. They are

conventions. Our choice, amongst all possible conventions, is guided by experimental facts; but it remains free, and is only limited by the necessity of avoiding every contradiction, and thus it is that postulates may remain rigorously true even when the experimental laws which have determined their adoption are only approximate. In other words, the axioms of geometry are only definitions in disguise" (Poincaré 1905). Albert Einstein similarly held the opinion that "physical concepts are free creations of the human mind, and are not, however it may seem, uniquely determined by the external world... the object of all science, whether natural science or psychology, is to coordinate our experiences and to bring them into a logical system" (Einstein and Infeld 1938: 297).

Development of this phenomenological and pragmatic perspective and its continuous correlation with experimental observations from a cognitive science viewpoint has culminated in constructivism (Foerster 1973; Maturana and Varela 1987; Glanville 1990; Riegler 2001). The idea that experiential qualities are internally constructed is the basis of the constructivist worldview. Constructivist theories of cognition maintain that learning involves an assimilation of perceptual constancies in terms of topographic similarities and temporal repetitions, and their fixation in forms of objects and their qualities (Glasersfeld 1995: 154) – which lead to improving the subject's coordination of experience. Each creature can thus be considered as a continuous creator of its own world of experience.

The constructivist models furthermore argue that one typically forgets this active nature of perception after a certain stage in the cognitive development. Awareness of continuous fixation of an unrepeatable stream of impressions fades away, and the objects become seen as pregiven (Glanville 2003: 101). Although this implies an impression that physical objects and their qualities are 'real', it is merely a cognitive illusion, since they are, instead, argued to be unique, subjective and unrepeatable interpretations of an always novel stream of information that 'flows' at the ontological basis of experiential phenomena (Glasersfeld 1995: 63).

Constructivist views of perception differ from their objectivist counter-models by granting an active role in the formation of elementary perceptions to the biological and psychological nature of the subject. These views rely on the fact that the biology of cognitive phenomena implies that the biophysical structure of an observer, along with the

history of its structural coupling with the environment, has to be actively involved in determining the qualities of external objects (Maturana 1990).

The biological nature of the observer is, however, not the only factor involved in defining experiential qualities. Cognitive predispositions, including values, emotions, anticipations, intentions, and aspirations can also be regarded as guiding the process of selection of perceptual stimuli and their construction into meaningful wholes during the formation of both *a priori* perceptual and *a posteriori* abstract impressions. Not only is it considered that implicit values govern the interpretation of experiential phenomena by imposing criteria of selection (during the accumulation of data and comparing logical propositions and inferences), but they may be regarded as guiding the formation of primary perceptions (Montuori 1993: 278). Such a view of perception has been correlated with the fact that scientific and philosophical reasoning rests on implicit assumptions that cannot be verified through experiments (Bröcker 2003: 54). Whereas Popper (1969: 51-52) shared this view and claimed that "all observations are theoretically permeated: there is no pure, disinterested, theory-free observing... our sensory organs embody that which adds up to prejudices", Jean Piaget (1965: 212) held that "a profound synthesis between beliefs and the conditions of knowledge is what we have named wisdom".

Since the subject is partly involved in defining the qualities of perceived physical objects in accordance with his biological and cognitive predispositions and states, some constructivist trains of thought go even as far as to claim that all seemingly objective representations of the reality should be considered only as metaphors, whereas all properties and qualities ascribed to experiential wholes should be, first and foremost, considered as humanly derived attributes (Uskoković 2009b, 2010b). Human assumptions about the nature of reality are thus reflected in the nature of scientific models as much as in the features of our experiential realities.

The basic tenets and scholarly roots of the philosophy of constructivism were mentioned in this section. In the following one, I will look at the basic flaws and problems faced by philosophies of constructivism and objectivism and call for a middle way between the two.

## 2. Navigating the epistemological ships between the solipsist whirlpools of constructivism and the inert streams of objectivism

Objectivism is a framework of thought in which experience is explained as essentially observer-independent and entirely defined by the nature of the physical reality. The conceptual and psychological flaws of objectivistic stances are numerous and have been pointed out in various ways (Capra 1982; Maturana 1991; Laszlo 1996; Foerster 1998), and will be only briefly mentioned here.

It is well known that Heisenberg's (1969) uncertainty principle demonstrates how an interaction with a measured system needs to take place prior to any detection thereof. The nature of this interaction is, of course, specific for each being or device -- which constitutes one of the basic problems that originate from the subjectivity of experiential and natural phenomena in general. Consequently, the way in which we pose questions predetermines the structure of the revealed answers; the way in which we look at the world predetermines what we will see – consequences that follow from the core of the constructivist viewpoint.

Living creatures react to environmental stimuli in accordance with their biophysical structure (Maturana 1990: 302; Piaget 1965: 17). What humans observe as qualities and objects, other animals would either not notice at all or perceptually assimilate into thoroughly different cognitive schemes. However, as the biophysical structure of each creature undergoes a continuous autopoietic process of self-generation (Romesin 2002; Varela et al. 1991), and as such is unique at any given moment of its existence, this leads to unrepeatable perceptions, data-compressing categorizations, and abstract interpretations. Hence, even if it is assumed that the subject undergoes an identical series of stimuli over time (which is, strictly speaking, a purely hypothetical case), the resulting perceptions will always be novel and unique. The fact that always novel neural patterns are activated in the brain upon performing approximately identical tasks speaks in favor of this (Pribram 1971: 113). It is worth recalling that from the objectivist perspective, the theory of relativity points to the relative character of experience in relation to the physical conditions of the existential reality.

The negative traits that objectivist assumptions leave on human reasoning and social interactions were criticized on numerous occasions (Foerster and Poerksen 2002a; Thyssen 2003; Maturana and Poerksen 2004). Neglecting the subjective character of all critiques, judgments and measurements was said to lead to a social epidemic of intolerant and manipulative attitudes (Kenny 2000:92). Disregarding the fact that phenomenological intentions, anticipations and aspirations become reflected in the observational outcomes has been hypothesized to lead to detached sense of responsibility for the state of the world, as all the experiential details become seen as events that take place in a distant and subject-independent surrounding (Bröcker 2004: 21). Each reference to external causality in the explanation of physical phenomena can thus be translated as an implicit excuse that "one is not responsible for the observed effects" (Glanville 1995: 316). Yet, suppressing responsible decisions diminishes one's creative capabilities, limits the space for trust in social interactions, and depletes one's inner sources of inspiration (Kordeš 2004: 76).

The objectivity with which one approaches analyses of experiential phenomena can be partly blamed as analogous to blurring the distincion between maps and their territories, and involves the necessary presence of language during the transmission of knowledge. Linguistic analysis of experiential events presents a necessary aspect of fruitful communication and mutual coordination of human experiences, which may be taken to be a pragmatic definition of science as well as of any other creative human endeavor (Winograd and Flores 1987: 12). However, its immanent flaws correspond to the fixation of objects and their qualities into mapped symbols and operations of the given formal system of reasoning. In order to provide conditions for an efficient communication via language, the constancy of linguistic notions has to be ensured. However, cognitive systems that make use of language are dynamic, in a constant process of renewal and innovation (Maturana and Verden-Zöller 1996; Bunnell 2004; Cecchi et al. 2004; Kondepudi and Prigogine 1998). In view of the contextually dependent nature of physical qualities, there are no constant, fixed, and ultimate entities in the organization of the world (Hiett 2001).

These problems entail each transfer of experiential knowledge into the communicative domain of language. Maps must be composed of fixed entities, but it is identifying these entities and the literal representations that they comprise not as modest

and pragmatic metaphors, but as true and universal reflections of the natural order that produces objectivistic flaws in our reasoning. Objective representations of natural phenomena are primarily pragmatic signs that facilitate human-to-human communication. At the same time, though, they provide conditions for diminishing the subjective sense of responsibility by accepting the observer-independent observational attitudes and erroneously identifying 'maps' with their 'territories'.

However, in applying one's efforts to cope with the 'streams' of objectivistic attitudes that are insensitive to subjective experiential effects, there is always an imminent threat of falling to the opposite side. Defined as a philosophical framework of thought in which experience is described as actively constructed from within the subject, constructivism occupies a complementary stance with respect to objectivism. It is, however, dominated by potential solipsistic 'whirlpools' that are insensitive to productive 'streams' of experiential commonality. In that sense, one of the gurus of the constructivist school, Heinz von Foerster (1979: 153), pointed out:

> This is a peculiar delusion within our Western tradition, namely, ‘objectivity’: ‘The properties of the observer shall not enter the description of his observations’. But I ask, how would it be possible to make a description in the first place if the observer were not to have properties that allows for a description to be made? Hence, the claim for objectivity is nonsense! One might be tempted to negate ‘objectivity’ and stipulate now ‘subjectivity’. But, remember that if a nonsensical proposition is negated, the result is again a nonsensical proposition. However, the nonsensicality of these propositions either in the affirmative or in their negation cannot be seen in the conceptual framework in which these propositions have been uttered.

Hence, by fighting the 'demons' of objectivism, there is a temptation that one will fall into the abysses of solipsism, epitomized in the opening words of Schopenhauer (1840:1):

> The world is my representation: this is a truth valid with reference to every living and knowing being, although man alone can bring it into reflective, abstract consciousness. If he really does so, philosophical discernment has dawned on him. It then becomes clear and certain to him that he does not know a sun and an earth, but only an eye that sees a sun, a hand that feels an earth; that the world around him is there only as representation, in other words, only in reference to another thing, namely that which represents, and this is himself.

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Yet, owing to the blind spot effect and an inability to gain full insight into the nature of one's cognitive assumptions (because they require an infinite chain of explications), an observer is never able to see his true 'eye that sees a sun', as much as he is not able to directly observe the ontological order of the world (D'Espagnat 1979: 32).

Whereas the uniqueness and individuality of experiences are a 'taboo' topic in objectivistic frameworks, the existence of common and 'shareable' experiences are also problematic for the solipsistic frameworks of reasoning. Thereupon, whereas the objectivistic standpoints naturally instigate quests for 'self-identity', originality, and specialness, the radical idealistic standpoints require an introduction of metaphysical reasons that would account for the existence of common and compatible experiences. Some of these metaphysical grounds invoked to overcome solipsistic "whirlpools" in different explications of the constructivist standpoints have included the following: (a)the principle of relativity according to which a scientific hypothesis is instantly refuted if it becomes proven as invalid from two different cognitive perspectives, preventing anarchistic "battles" between pure idealistic stances (Pakman 2003); (b) Kant's categorical imperative and identification of reality with togetherness (Foerster 1995a,b); (c) an ethico-aesthetical imperative (Glanville 2001); and (d) the innate propensity of biological creatures to, simply, love (Maturana and Varela 1987).

To sum up, constructivism *per se* faces difficulties concerning attempts to explain the sources of compatibility of experiences of different subjects, whereas objectivism is intolerant to the presence of subjective effects in scientific reasoning. Loking for a basis for resolving the conflict between constructivism and objective realism, the next section

explores a midway metaphysical worldview. In order to reach it, I will start from an insight into the functioning principle of the eye, an example that illustrates the creativity intrinsic to sensory organs. I will then show that it is in concert with the tenets of constructivism.

**3.The eye example**

Many experiments have shown that the eyes and other sensory organs aren't mere passive tools that represent patterns of light or other environmental stimuli (e.g., Lettvin et al. 1968). Instead, they are actively involved in selecting the stimuli and in their reshaping and adaptation to the cognitive needs of the subject (Winograd and Flores 1987; Neugarten 2006).

Whereas ancient Greeks believed that the human eye throws light to the world and thereby makes things visible (Park 1997: 34), the classical theories of vision are based on the idea that external photons activate light-sensitive sensory cells and initiate propagation of the corresponding signals from the optical nerve to the brain where an image of the viewed object is formed (Edelman 1992: 19). These two views can be merged into a single mechanism that more faithfully accounts for visual perception. The classical theories of passive sight, which represent the human eye as analogous to a photo-camera, are gradually being replaced by the theories of proactive sight (Findlay and Gilchrist 2003), which acknowledge the key role of the sensory dynamics in perceiving the world as we see it.

Environmental stimuli do not cause activations of neural networks before the sensitivity threshold of the given sensory unit is exceeded. However, arrival of a useful sensory signal at the visual cortex is conditioned not only by a finite level of illumination on the visual receptors, but by modulations of the light, taking the form of perceptual comparisons in the visual field.. Only receptors in contact with the boundary – such as a variation in illumination or wavelength of light – will be able to produce a neural signal and initiate a visual representation of the given stimulation (Foerster and Poerksen 2002b: 144). All sensors, artificial or natural, in fact, can detect only differences, which may explain why Gregory Bateson defined information as "a difference that makes a difference" (Bateson 1979: 17). Uniform flow of any stimuli provides imperceptible

information unless it becomes modulated by either the action of the sensory organ itself or by environmental effects.

For that reason, the human eye possesses a set of fine strategies that provide it with the ability to detect even uniform signals from its surrounding. During a visual observation, micronystagmic eye movements continually shift the position of the light-sensitive retina cells relative to the optical image in order to modulate the monotonous signals that come from the environment and render them perceptible (Fischer and Ramsperger 1984: 194). The scanning activity of the eye presents another means by which the eye maximizes the information input. These subtle movements are a consequence of the ability of sensory organs to detect only differences as information. Only dynamic changes in perceptive stimuli can cause sensory perturbations and initiate perceptual activities within the organism. Hence, both the physical surrounding and the active perception of the subject are involved in defining and sustaining this dynamics. Visual and other sensory representations do not present results of a passive impression of environmental patterns upon a *tabula rasa* of one's mind. They are products of perceptual processes through which the subject internally constructs viable representations of the relations between the self and the environment.

The amount of information that an eye can perceive at any moment is so big that it would cause a paralyzing confusion in the brain if it were detected in its entirety. As a result, habitual recognition and a sketchy construction of visual objects from memory are regularly carried out in advance to and aside from their perception in detail every time we notice them. In fact, interpretation and compression of the 'perceived' data begin already at the processing level of the optical nerve. Signals that arrive to the brain are, therefore, redundant and already 'interpreted' to a certain extent (Fletcher 2001: 128). One such *a priori* internal construction takes place constantly during our visual observations to make up for the imperceptible blind spot which appears where the optical nerve leaves the eyeball. With one such filling of this blind spot with what the brain assumes should be seen there, the observer thinks that he does see what actually is there when, in fact, he does not see that he does not see (Maturana and Varela 1987: 19). The awareness that we would not see that we do not see unless we change the observation position is a profound systemic discovery. This effect reveals the importance of including

subjective/constructive aspects within all models of perception and cognition. Furthermore, conscious shifts of attention between perceptible boundaries within one's visual field contain another subjective factor, for the fact that these shifts of attention and gaze are essentially guided by our anticipations, habits, perceptual questions and, ultimately, values. This suggests that seeing is equally actively seeking and constructively drawing as much as passively finding and objectively detecting (Gibson 1986: 72).

Experienced telescopists and microscopists are aware that the results of their measurements present intersections between the 'real' observed objects (although invisible as such) and the aperture settings. Atomic force microscopy, one of the most powerful techniques for the visualization of material structures on the atomic scale, provides images that are not representing how the samples look like in reality, but are, in fact, convolutions of the microscope tip shape and the surface morphology (Uskoković 2009a, 2010a). Distortions of the tip shape are correspondingly directly reflected in the appearance of the observed particles. However, it is an inescapable fact that even under perfect conditions rounded tips would naturally increase sphericity of the analyzed entities, whereas the sharp ones would promote similarly sharp morphological features of the observed particles. Another example may come from the traditional analyses in the field of microbiology where a repertoire of stains is used to color specific cellular compartments. Each stain thus reveals an aspect of the cellular anatomy that is invisible when another stain is used (Harre 2003). Furthermore, high-resolution microscopic histological analyses are normally preceded by sectioning, fixation, dehydration, wax impregnation, and staining of the analyzed systems, resulting in sometimes significant distortion of their properties of interest (Grimes and Aufderheide 1991: 5). In any case, the micrographs obtained are not faithful images of the real structures, but rather artifacts that reflect both the properties of the analyzed systems and the features of the measuring devices and their settings.

It is, therefore, a rule that properties of the measuring instrument must be included in the description of each experimental study. Likewise, products of our perception are outcomes of the interplay between our properties as observers and the 'real' observed systems; yet, we often forget to acknowledge the effect of our biological and cognitive

properties as self-observers in crafting the appearance of the products of our perception. Consequently, everything characterized as a quality in the world of one's experience needs to be implicitly regarded as a way wherein the subject's cognitive foundations present one 'co-creational' side, whereas features of the 'hidden reality' present another. Perceived qualities do not point to *a priori* existing relationships and entities, independent on the observer's epistemological bases. Instead, these qualities are results of an active interaction between the observed system and the subject. Such an interaction between mind and nature, during which qualities comprising one's world of experience are formed, I name 'co-creation' of experiential qualities.

All objects may be therefore considered as products of the dialogue between mind and nature. They are threads that connect the 'hidden reality' of nature with the epistemological core of the observer. Martin Buber noticed that "all actual life is encounter " (Buber 1923: 63), which means that every experiential instant may be seen as an encounter between the foundations of our being and the 'hidden reality'. This is not far from Hegel's claim regarding the fundaments of the phenomenology of the mind: "The universal divine man, the spiritual communion, has as its father its own proper action and knowledge, while its mother is eternal Love, which it merely feels, but does not behold in its consciousness as an actual immediate object" (Hegel 1807: 132). Statements such as these may gather a new meaning in the light of the thesis of the co-creational nature of experiences.

**4. The relevance of both subjectivist and objectivist presumptions**

In the previous section, I argued that all results of one's perceptual and 'representational' activities emanate from a continuous co-creative 'dialogue' between the 'hidden' epistemological foundations on the subjective co-creative side, and the 'hidden' ontological foundations on the realistic co-creative side. Hence, no property from any field of science or everyday reasoning could be defined without respect to both its subjective and realistic aspects, which implies that both constructivism and objectivism are relevant for forming a thorough epistemology. This is a classical systemic assertion that can be evidenced on an endless number of examples.

Should we try to define any human property, for example, we would realize that none of them could be represented without taking into account the interaction between the subject and its surrounding. Aesthetic impressions of worldly objects can be likewise understood only as arising at the intersection between an experiential context that the subject brings forth and the features that the object of contemplation can be attributed to.

If we endow an object or a being with a quality of goodness, it does not mean that they are intrinsically good; it rather means that they are good in interaction with us as observers as well as in comparison with other objects or beings of interest. Likewise, if one notices that an object is firm, it does not mean that it is intrinsically firm. It means that it is stable upon applying a mechanical pressure onto its surface. Because of the relative nature of observation and definition of physical qualities, one assigns units thereto and thereby implicitly compares the obtained values to a given standard. In physics, hardness is defined in terms of pressure units. As such, it is related to the humanly derived concepts of space, time and movement. However, it possesses a scientific and practical meaning only relative to the hardness of other materials. In mineralogy, hardness is measured on the Mohs scale where diamond is the hardest and talc is the softest mineral. Any attribute ascribed to experiential wholes presents a result of comparison with some preconceived referential norms. Therefore, it is both subjective and objective references that need to be established in evaluation of the qualities of objects.

In the world of physics, e.g., we can realize how, although it is a general rule that the higher the wavelength of light the easier it penetrates the objects on its way, the penetration depth of light could not be explained by referring to its frequency only. The properties of the medium through which light travels are also important. It is, therefore, the interaction between light and atoms and molecules of the medium that determines whether the light will be reflected, absorbed or passed through.

In the world of medicine, we can notice how the quality of a material applied to restore damaged tissues could not be defined without a reference to the area of its application in the body (Uskoković et al. 2006). Specific material properties that prove favorable in one context might turn out to be detrimental in another. The effective application of each biomaterial critically depends on favorable feedback interaction

between the living system and the material, during which both are subject to change. A perfect hard tissue substitute is, for example, meant to be thoroughly absorbed by the body in the course of regeneration of the tackled tissue, which implies a change of both sides in interaction: the material and the body.

In the world of sports, the question whether swimmers should move faster in chlorinated pools or in salty water would lead us to the same insight. In order to answer this question, we need to take into account both the subjective and the objective factors. That is, the emphasis needs to be placed on interaction, in this case between the swimmer and the water. First of all, the swimming velocity of a swimmer would vary depending on the density of the medium. For any particular swimmer, there is an optimal viscosity of the swimming medium at which her speed would be maximal. But that is only the objective aspect of our analysis. On the subjective side, we may notice how the human body is subject to modifying its constitution depending on environmental and behavioral requirements. Therefore, a swimmer moving through a lighter medium would gradually develop a lighter body that would propel it quicker in that particular medium, whereas a swimmer swimming only in a denser medium would develop a heavier constitution. This discussion resembles the one over which athletes have wondered for a long time. Athletes run faster and jump higher and farther at high altitudes where the air is less dense; on the other hand, the lesser pressure and the lower amount of oxygen in the air if compared to zero altitude poses limits on their performance (Uskoković 2009d).

The same type of reasoning can be applied to the question of whether it was giraffes that developed long necks to reach the fruits of tall trees, or it was the trees that grew tall to escape from the reach of the browsing giraffes and other terrestrial animals (Uskoković 2008b). It is impossible to observe only one side of any interaction, because it is imperceptible, just like the 'one-hand-clapping' from the famous Zen koan. Many other co-evolutionary questions could be answered using the same type of circular, feedback-permeated logic, bringing us to Wittgenstein’s guiding line, "In order to draw a limit to thinking, we have to think both sides to this limit" (Wittgenstein 1918: 7/Preface), and to the acknowledgment that co-evolution of the system and its environment is how the world – and we in it – evolve (Uskoković 2008a: 46).

This characteristic of the evolution of physical systems in general leads to the use of circular causality in describing them so as to overcome the logical paradoxes that arise from their descriptions based on linear logic (McCulloch 1965:112; Bateson 1972:34; Pask 1975:155). The main problem entailed by describing such feedback-based systems, which include practically all cognitive systems owing to the default autopoietic organization thereof, relates to unsolvable nonlinear equations that naturally arise out of numerical attempts to model them. Linear representations of physical processes are commonly, practically pervasively used in hard sciences, even though they contain inherent flaws, which become particularly obvious when living systems are attempted to be described by their means. Still, linearization of naturally nonlinear phenomena for the sake of representing them as analytically solvable equations has become ubiquitous practice in scientific simulations (Capra 1996: 79) Overall, he has pointed out inherent flaws of it when it comes to its application in the description of biological entities. However, he has mentioned as well that they are still commonly used because of mathematical conveniences they introduce]. Yet, all physical systems follow the principles of nonlinear logic in their evolution, as can be exemplified by recalling that even Einstein's famous equation '$E = mc^2$' was derived after omitting an infinite number of its nonlinear terms in the process of its linearization (Kosko 1993: 278), as well as that the linearity of quantum theory was adopted at the cost of introducing the infinite-dimensional space, as each finite-dimensional nonlinear model can be routinely transformed into an infinite-dimensional linear model (Esfeld 2004: 627). Finally, the fact that there can be neither an 'observer' without an 'observed' (i.e., a perfectly insightful observation of the cognitive bases of the subject's worldviews) nor an 'observed' without an 'observer' (i.e., a perfectly objective insight into the nature of the physical reality), as well as that each observation implies mutual transformations of both the observer and the observed, implies that a cognitive subject's attempts to comprehend the co-created experiences may be regarded as a dizzying "application of an instrument of analysis to analyze the instrument of analysis" (Maturana and Varela 1987: 141). Gödel's theorem has already pointed out that "if human mind would be simple enough to be understood, then it would be too simple to understand it" (Fletcher 2001: 93), suggesting

infinities arising ‘behind every corner’ upon our attempts to reach perfect models that describe even the simplest physical systems, let alone our cognition.

**5. Every quality is a way**

The co-creational thesis can be described as the idea that every product of human perception can be metaphorically depicted as drawn on the canvas of one’s mind involving both the creativity of the subject and the creativity of nature in the act of drawing. This thesis argues that both the biological and cognitive predispositions of the subject and the external features of the physical reality determine how the world appears as perceived through the subject’s senses, and as such occupies a middle ground with respect to the worldviews of objective realism and constructivism.

Since each detail of one’s experiential world comprises both a common, ‘objective’ aspect that enables its ‘sharing’ with others, and a unique, personally constructed side, we can consider every quality as a way, a connection between the epistemological foundation of one's mind and the ontological foundation of the external reality. An inseparable connectedness between the realistic and idealistic aspects of one’s experience can also be postulated. Ultimate intrinsic qualities of objects, which would correspond to Kant's things-in-themselves, cannot be known alone, and the same can be said for the deepest cognitive patterns that guide our perception and reflections. They become revealed only in conjunction with and reflection from its complementary co-creative side.

As we have seen in the previous section, although most of the actual scientific representations, and particularly the popular ones, implicitly comprise a presumed existence of an observer-independent reality, all seemingly intrinsic physical qualities, such as energy or momentum, can be defined only in terms of their relations with the postulated environments. For example, a particle is energetic only by reference to the environment that it passes through (Uskoković 2008a). Its energy content is thus inseparably related to its environment. The same principle of contextual definition of qualities may be applied in any other domain of co-creation of experiential phenomena, including biological, ecological, social, and cosmological. The fact that we have to refer

to the realistic nature of the rest of the world in order to define the intrinsic qualities of any natural system is consistent with the co-creative coalescence of subjective and objective features in any conceivable experiential event.

Hence, from the realistic point of view, each system quality can be described as a set of relations that constitute the system and yet figure in the interaction between the system and its environment. These can be imagined as forming an ontological set of relations with the object lying in its center. From the idealistic point of view, however, each quality of a system corresponds to a harmony of relations that extend between a perceptual representation of the system and the subject's interpretational context. These relations can be viewed as constituting an epistemological set of relations with the subject placed in its center. Along the intersection of these two sets of relations is the space where the perceptual experiences arise, according to the co-creational thesis.

The ontological set corresponds to an infinite spectrum of relations through which the observed system interacts with the rest of the universe. The epistemological set corresponds to the observer's interpretational foundations and rational tools through which she approaches the observation of the given system. Products of human perception correspond to tiny areas of intersection between the sets of ontological and epistemological relations that the observed systems and the observer engrain, respectively.

## 6. Informations of the world as differences

Consideration of every experiential quality as a way, that is, a boundary between the perceptually active subject and features of the environment is supported by the aforementioned sensitivity of cognitive systems to differences solely.

The inner construction of perceptual wholes and abstract concepts is based on a subjective absorption of perceptual impulses that firstly appear as differences at the being/environment boundary. These primary differences instigate the subject to semi-autonomously, i.e., in concert with environmental indications, construct perceptual and abstract wholes that conform to the cognitive capacities of its biological structure.

The realistic side of the co-creation of experiential qualities comprises environmental differences that ‘invite’ cognitive systems to internally construct the corresponding differences within their cognitive networks. In that sense, only impulses of the environment that succeed in inducing a change in the structure of the cognitive being can be considered as information (Bateson 1979). Information may be regarded not as an objective quantity, but as a qualitative process of informing (Železnikar 1990), although pervaded with potential ambiguities that arise out of its inherent subjective character. Yet, comparison between at least a pair of perspectives may be regarded as the starting point of each scientific and philosophical thread of thought, and incompatible descriptions of the ‘same’ systems from different perspectives may provide these starting points for branching of knowledge (Uskoković 2009c). For, only synthetic comparisons of different, seemingly incompatible perspectives, may give rise to novel epistemological concepts. In the aforementioned example of evaluating firmness of a pebble, it was a comparison of one measured quality (i.e., structural integrity) before and after the interaction with the measuring device that yielded another quality of the system (i.e., firmness). "Relationship is always a product of double description" as Gregory Bateson (1979: 21) pointed out. Hence, it is not only that each representation of our experience requires comparisons of perceptive and symbolic constancies. In order for any abstract inference to be arrived at it becomes necessary to perform a comparison between at least two logical propositions.

The fact that only contrasts, fluxes, changes, and differences could be sensed by biological systems explains why on the realistic co-creational side everything potentially observable presents qualitative emanations of relationships and processes, whereas on the subjective co-creational side one needs to constantly change perspectives in order to be able to notice subtle changes within frequently almost constant flows of environmental stimuli as sources of information. Namely, "the unchanging is imperceptible unless we are willing to move relative to it" (Bateson 1979: 89).

In order for anything to appear, a boundary that intersects a single entity or perspective into two contrasting entities needs to be drawn (Baecker 2002: 56). To render information perceptible, a boundary between two individually imperceptible areas must be established. The consequences of each piece of information being a boundary that

divides a given uniformity to an 'inside' and an 'outside' are clear: every knowledge comprises a polar structure; every distinction and description implicitly point to the rest of one's experiential context; every critique and declaration of goodness and viability implicitly point to what is not good and viable, etc. As it acts as a link between particular 'insides' and 'outsides', each piece of information at the same time separates and connects the respective poles. Hence, it could also be regarded as a way. For, each way represents a path of simultaneous separateness and connectedness. The Way as a symbol can thus be referred to as an epitome of this dialectical synthesis of mutual antipodes. The co-creational dichotomy between mind and nature undoubtedly reflects the same symbolism of the Way (Uskoković 2009b).

The evolutionary progress is associated with the formation of ever subtler differences at the being/environment interface (Malik 1995: 47). The evolution of human knowledge likewise implies the process of differing within continual and uniform wholes, and thereby resembles the role of 'Maxwell's demon' (Glanville 2003). "Draw a distinction and a Universe comes into being" was the celebrated George Spencer-Brown's (Brown 1969: 37) norm. In fact, the emergence of two from one has ever since presented a miraculous natural event. The moments of the Big Bang, of the first division of a fertilized egg cell, and of a hypothetical decision of a being living in a Schopenhauerian world in which the environment perfectly mirrors that being's aspirations and desires, to sacrifice its uniqueness and share the world with a co-creational 'partner', are examples that concord with the Chuang-Tzu's (400 BC: 71) co-creational observation: "If there were no others, there would not be me either".

The fact that living creatures are able to perceive only differences may also explain why abstract reflections are predisposed for analytical reasoning. Thinking through which boundaries between both perceptive constancies and their abstract representations become diversified during the development of one's knowledge amounts to a continuation of the child's perceptual distinctions aimed at improving the coordination of its experience. Yet, as the constructivist theories indicate, a child's construction of experience is based on the simultaneous application of diversifying distinctions and synthetic assimilations of elementary experiences into wholes that include objects and other beings (Piaget 1962: 43). Patterns composed of alternate

differing and merging can thus be recognized as the elementary matrices of perception and reasoning. The metaphor of the Way depicts such a simultaneous separateness and unison, which is another reason for its meaningful application as a metaphor of the thinking process.

The classical constructivist example in favor of this model for reasoning is the one where the subject hears multiple dongs from a grandfather clock, and is free to decide whether the clock struck the first hour multiple times or it struck an hour indicated by the number of consecutive dongs (Glasersfeld 1995: 163). Similarly, the environment can be said to provide stimuli that cognitive beings autonomously arrange into categories by applying the operations of identifying and distinguishing. The basic concepts of scientific reasoning, including Cartesian coordinates, time and mathematical operations are thus co-created in the interaction between the environmental stimuli and the constructivist minds. Mathematical abstractions as prototypes of conceptual patterns detached from the real-life experience may be, therefore, considered as founded on ‘realistic’ grounds as much as on subjective ones. Explorations of the physical phenomena that are regularly considered as detached from their subjective aspects may be, likewise, acknowledged as co-creatively founded upon subjective and realistic grounds. As Erwin Schrödinger (1944: 136) put it, "the world appears as one, and not as the world that exists and the world that is observed. The subject and object cannot be separated… an object and its image in the mirror are one and the same. The world extended in space and time is but our representation". Indeed, the co-creational perceptive coalescence of the observer and the observed prevents any attempts of non-arbitrary and ‘neutral’ distinguishing between the two.

The co-creational nature of the construction of primary experiential qualities and of their subsequent assimilation into perceptual and abstract wholes implies that the subjectivization of one's mind in the early stages of life proceeds in parallel with a rise in awareness that objects seemingly belong to an 'external' world. Qualities of the co-created 'external world' become seen as pregiven, despite the fact that they are semi-subjective constructions. "All objects are indications of processes and symbols of the capability of our neural systems to create stabilities and calculate invariances" (Poerksen 2003: 15), Heinz von Foerster noticed. During a child's cognitive development, the relational

character of objects and qualities gradually fades into cognitive background, whereas assumptions of the existence of an objective world take over and become affirmed as the basis for the coordination of experience. Nonetheless, there can be no subject/observer without object/observed, nor *vice versa*. As Martin Buber (1923: 78) noticed, "it is not the case that a child observes an object first and then sets itself in relation to it. The tendency towards forming relations comes first". The co-creation of experiential qualities implies that the subject simultaneously and interdependently establishes awareness of self and of objects. Neglecting the co-creational links between the 'observer' and the 'observed' may lead to an illusion of alienated dwelling in a world that develops independently of our deepest aspirations. As Martin Buber (Ibid.:102) further noticed, "If culture ceases to be centered in living and perpetually renewing relational appearances, then it hardens into It-world...then smooth causality, which did not have the power of disrupting the spiritual conceptions of the Universe before, rises until it becomes an oppressing, suffocating destiny".

**7. "Two nodes and a change" as the mechanism of thought**

Every description and every act of creation, as we see, imply a formation of polarities. Every postulated relation necessarily comprises two end points. Consequently, in order to define or observe any change, it becomes necessary to establish a relation between at least two constancies. A change in the distance between two objects can be, for example, observed only after their constancy in time is assumed. If one observes a shift in the position of a star by comparing two photographs of a constellation, this would be based on the assumption of a constant appearance of both the star and the constellation in the background. Analogously, each described property is always drawn relative to some implicitly presumed constancies. There can be neither absolute qualities nor absolute skepticism and query. For, "If you tried to doubt everything you would not get as fas as doubting everything. The game of doubting itself presupposes certainty " (Wittgenstein 1951: 18).

The existence of two fixed end points and a change may be thus regarded as the basic mechanism of thought. Such a nature of reasoning can also be represented by the

metaphor of the Way, as well as by the music metaphor: like the simultaneous separateness and connectedness symbolized by every way, acoustic oscillations arise by two nodes alternately approaching and distancing each other. "Two nodes and a change" as the fundamental strategy of human thinking reminds one of music played on guitar strings. Scientific explanations ultimately rely on relationships, and many failed scientific worldviews pertained to the adoption of certain qualities as single determinants of physical properties, ranging from the single elemental theories of nature of ancient Greeks to the phlogiston theory to the tenets of phrenology and many other theories attempting to explain phenomena by invoking a ‘dormitive principle’ of a kind (Bateson 1972: 12). Despite this, the nature of human reasoning is such that an explanatory principle (corresponding to fixing the nodes and thus enabling the strings of constructed relationships to produce music) needs to be employed within each explanatory procedure. Explanatory principles as the key points in formal systems of reasoning can only be invoked, but never explained, particularly because they are used to explain everything else (Bateson 1972). As such, they resemble the Sun, whose effects as a source of light can be appreciated, but cannot be looked at directly.

The examples of explanatory principles in science may include 'gravity' in classical mechanics, 'speed of light' in Einstein's theory of relativity, 'instinctual drives' in psychoanalysis, and 'genetic code' in molecular biology. Philosophical examples may include the concepts of 'will', 'absolute', '*a priori* categories of understanding', 'monads', and '*res cogitans*' in the philosophical systems of Schopenhauer, Schelling, Kant, Leibniz, and Descartes, respectively. In theology, the concepts of God, soul and the Holy Spirit are 'explanatory principles' placed as the end points of one's inquiry within given systems of reasoning. However, explanations based on single-variable models and unilateral principles acontextually designed to account for all natural phenomena, regardless of the other interactive side, are predestined to failure: “disagreements in philosophy are due to exclusive emphasis on one member of any given dyad" (Buckham 1942: 412).

**8. Harmonious cognitive and psychosomatic effects of the co-creational concept**

The co-creational thesis explains the origins of experiential qualities through a mutual creative involvement of the subject and its environment. This implies that individual experiential worlds cannot be considered as solipsistic 'inventions' independent on the environmental content. They cannot be taken as objectivistic 'discoveries' independent on the subject's cognitive foundations either. Instead, all the products of one's perception are signs of a co-creational contact between the subject and its environment. The traditional Western, objectivistic quests for the ‘treasures of life’ in external situations and landscapes, independently of the epistemological settings of one’s self, can be therefore seen as incomplete. However, the frequent Oriental tendencies to neglect anything but enlightening the cognitive foundations of the subject can be seen as equally imperfect (Witten and Rinpoche 1998: 117). This is so because, as dictated by the basic principle of the co-creational thesis, the creative contribution in outlining the features of one’s experience is always divided between its subjective and objective poles.

It is true that the constructivist aspect of the co-creational thesis implies that by changing oneself from the inside, the world that one experiences changes as well, because the subject is partly involved in creating his world of experience. However, this construction of the world always proceeds in conjunction with environmental incentives. The realistic aspect of the co-creational thesis, therefore, implies that the world as-it-is, presumably existent from the constructivist point of view but treated as a Wittgenstenian realm ‘whereof one cannot speak and must pass over in silence’ (Wittgenstein 1917: 97), inevitably defines the subject and the way in which he perceives the reality. In other words, the co-creational thesis tells us that as the human mind draws the features of nature, while nature draws the features of the human mind, at every moment during their co-evolving existence. As a result, one incessantly reflects nature in one’s reflections, whereas everything comprising one’s experience is partly an invention of oneself. This implies that we can recognize both our cognitive essence and the ontological foundations of nature in every detail of the world of our experience.

The idea that the complexity of human cognition is reflected in the complexity of experiential phenomena is supported by the fact that as research objects get closer to the observer's mind – from astronomy, geology, and geography to anatomy, physiology, and psychology (White 1949: 211 ) – the difficulties in describing the 'real' systems in

question increase. It was thus proposed that accepting the mechanistic explanation of the evolution of life would merely lead 'the enigmas of the Universe' to switch their place with 'the enigmas of human cognition' (Koyré 1973: 89). On the other hand, accepting the solipsistic idea that the Universe is nothing but a giant tautology would lead to an opposite shift in the actual enigmas. Consequently, in quests for the paths of destiny one would be conducted to the ancient prophecy of the oracle at Delphi: Know thyself'. But in quests for the inner sources of harmony one would be led to hear the 'still small voice' of nature behind the co-created experiences. Thereupon, natural laws can be said to be neither passive objectivistic 'discoveries' nor solipsistic 'inventions'. They are higher-order products of the co-creational intersection of idealistic and realistic experiential aspects.

From the co-creational perspective, each experiential detail can be regarded as a ‘sign’ that metaphorically points to the subject’s deepest values and aspirations. These values and intentions comprise some of the deepest cognitive layers that affect the experiential co-creation from the subjective side. But each experiential detail is also a sign that points to the ontological origins of the observed objects, which comprise the realistic content of the co-creation of experiential qualities. The ‘hidden’ character of both co-creative sides justifies the use of metaphysical and theological metaphors in representing experiential details as the products of communication between mind and Nature. The ‘Eyes and the Sun’ of one’s experience may be regarded as metaphors for the two creative sides involved in the emanation of experiences. In the aforementioned example of the eye, we have seen how there is both light in the world and ‘light’ in the eye. Intersections of these two ‘sources of light’, representing the domains of an objective natural reality and a subjective epistemological core, respectively, giverise to every form of experience. Explorations of the epistemological foundations in terms of observing the reflections of the subject’s assumptions and aspirations on the state of his experiential world represents one part of the co-creational adventure of the human mind. The quest for the ‘guiding voice’ of nature that pervades the world as emanating from the ontological foundations of the experience represents another side. Relating these two sides may become regarded as the essence of metaphysical and theological studies. It is highly probable that in the course of such a quest one will realize that discerning the

reflections of one co-creative side implies an insight into reflections of the other. The neo-Hegelian dialectical representation of the ontological nature of the world would thus be confirmed (Weischedel 1966: 163; Ward 2003: 150).

Through embracing the co-creational nature of experiences, many cognitive disharmonies could be overcome. The latter can be said to result from the subject's 'receding' towards a single side involved in this balance. The symptoms of overly approaching the side of 'nature' are observations of a predestined, mechanistic, and observer-independent world. This makes us neglect the importance of improving the foundations of our thinking. Extremely approaching the side of 'mind' alone, on the other hand, makes us forget about the importance of comparing rational and emotional perspectives with others, which results in the sense of isolation and egocentric desperateness. Guided by the idea of the co-creation of experiential qualities, one is able to find a compromise between living in harmony with the inner 'landscapes' of one's reflections and yet living for the sake of enlightening others. One then self-responsibly and sanely brings decisions from the core of one's being and yet incessantly looks after "watching the world from the eyes of another" (Churchman 1968: 212). For, the most creative expressions of ours is given rise to by empathically shifting our attention onto needs of others, while the highest levels of empathy are attained by having our awareness firmly rooted within the epistemological core of our being. Through this apparent paradox, we realize that the creativity promoted by the constructivist elements of our experience fosters the creativity exhibited by the realistic elements, and *vice versa*.

A fundamental consequence of the co-creational nature of the emergence of experiential qualities is that epistemology and ontology, as much as constructivism and objective realism, may become integrated into an interdependent and inseparable whole. Therefore, if one seeks to unravel some of the natural mysteries, one has to know how humans know, whereas if one seeks to know oneself, one must face the mysteries of nature in one's quests. Acknowledging the co-creational and partly subjective character of the scientific practice, a large extent of the passive programmatic aspect of scientific progress would cede place to more creative research attitudes, pervaded with a greater ethical responsibility of the researchers. The way of science leads through humanistic pathways, whereas real humanism cannot be separated from a pragmatic and rational

inquiry about nature. Many contemporary scientific disciplines and theories, including systems theory, theories of constructivism and autopoiesis, second-order cybernetics, information theory, and theories of non-linear, dynamic and complex systems, inherently consider the fundamental epistemological question: 'How do we know?' Owing to the co-creational coalescence of the observer and the observed at the perceptual and interpretational levels of the observer's experience, an insight into this basic epistemological question simultaneously opens the way for improving one's understanding of natural realities. It is through deepening the basic epistemological questions that one discovers the metaphorical and social character of science and language (Uskoković 2009b).

Finally, besides their partially metaphoric character, a shared feature of science, philosophy, and religion lies in their aiming at representing connections between the invisible foundations of reality and the apparent experiential phenomena (Uskoković 2010b). The co-creational thesis built on the presumed dialogue between human mind and nature and possessing both scientific support and theological meaning can be seen as the metaphysical ground upon which science and religious thought can coexist in peace and harmony. The co-creational nature of experiences can be used as a basis from which the metaphoric, multiversal, and pragmatically co-orientational character of sciences, religions, and other communicational endeavors can be derived.

## 9. Final words and a final gaze at the starry sky

So far we have seen that the idealistic aspect of the co-creational formation of experiences implies that both perceptive and abstract elements of one's experience stem from the subject's cognitive roots. However, the realistic character of the co-creation of experiential qualities prevents us from being caught in the 'whirlpools' of solipsistic worldviews that may follow from these idealistic assumptions. Extreme idealistic and realistic standpoints, corresponding to pure solipsism and passive representationalism, respectively, thus become merged into the dynamic subjective/objective balance of the co-creational model.

Accepting both realistic and idealistic origins of experiences might promote subjects' responsibility for perceptive, abstract, and behavioral co-creations. The fact that cognitive results of the biological activity of a single organism are neither completely incompatible nor entirely identical with and reducible to experience of others supports the realistic-idealistic middle Way adopted by the co-creational thesis. Our models of experience, individual and scientific alike, can be therefore taken not as truthful, realistic, and universal reflections of an objective world that is the same for all observers, but as partly subjective and metaphorical in nature, a product of individual and social imagination as much as an objective reflection of the world *per se.* In view of that, products of our creativity, daily and scientific alike, serve the pragmatic purpose of enlightening human experiences as much as of discovering the nature of the physical reality, independently of us as subjects. The classical, objectivistic approach to studying 'natural' phenomena and the modern, constructivist approach to organizing 'experiential' phenomena could thus be considered as complementary aspects of an ultimate general framework for describing and managing experiential realities.

Reconciliation of seemingly contradictory approaches to explaining cognitive phenomena, such as the one carried out in the scope of this work, has been a basic path of progress of philosophical thought throughout its history (for an example, see Dascal and Firt 2010). For example, Galilei believed that the Earth was moving and that the Sun was still; Inquisitional premises were opposite – the Sun was moving and the Earth was still; Newtonian astronomers, however, came to the conclusion that both the Earth and the Sun were moving. However, from the relativistic framework, that is, by revisiting the meaning of notions such as ‘rest’ and ‘motion’, all of these three astronomical worldviews may be shown as equally ‘true’ (Whitehead 1925). The approach applied in this work has dealt with one similar revisit of the metaphysical foundations of the confronted models of objectivism and constructivism and might offer a key on how to resolve many similar epistemological disputes. Other examples many include Kant’s philosophy of transcendental idealism that united the philosophies of rationalism and empiricism; merging of Huygens’ wave theory of light and Newton’s particle theory of light within the quantum theory concept of wave-particle duality of all physical entities; and topological geometry which united the concepts of Euclidean, metric geometry, and

analytical, projective geometry. This brings us to the following Chuang-Tzu's (400 BC) observation: "Hundreds of doctrines march forward instead of turning backwards, and are thus predestined never to conjoin… Yet, Tao is not choosing between this or that; it is walking in togetherness with all of the streams". The middle Way approach, having sprung forth from the ancient Taoist tradition, has been applied in this work too and can hardly be expected to lose its timeless systemic relevancy in the future. For, as expounded earlier, alternate diversifications and syntheses, which are implicitly ingrained in the very concept of the Way, as it epitomizes simultaneous separateness and connectedness, explain how knowledge evolves on all scales.

Simultaneous connectedness and separateness conveyed by the symbolism of the Way and associated here with the nature of elementary experiences finds its meaning in the domain of harmonious social interactions too. Namely, simultaneous introspective withdrawnness, as in the spirit of constructivism, and compassionate sharing of experiences, as in the spirit of objectivism, has been earlier invoked as the key to the art of loving (Gibran 1923; Fromm 1956; Uskoković 2009d). However, finding a balance between the self-responsible constructivist placing of the reference for one's ideas and expressions at the core of one's being and the empathic 'realistic' devotion to observing 'the world from the eyes of another' is a hard task, although not an impossible one. Enlightening actions responsibly refer to the cognitive core of one's being, but point towards the beauty and significance of others. The drives behind the co-creation of perceptual and reasoning patterns thus need to incessantly 'face' others (Buber 1923), and yet originate from the core of one's being. One's creative being then becomes reminiscent of a star: fusing cognitive impressions within the core of one's being and forming a creative energy thereby, which serves the sole purpose of bringing light to all that surrounds one.

Finally, I will invite you to take a look at a starry sky and vaguely draw a reference to von Glasersfeld's example of observing celestial constellations, which he used as an illustration of the constructivist thesis (Glasersfeld 1998: 28). From the constructivist point of view, the appearance of a specific constellation depends on subjectively performed perceptual operations during the process of observing. From the realistic point of view, the appearance of the constellation is also dependent on the

objective viewpoint the observer occupies in relation to the celestial order of the universe. Whereas the subjective aspect of the experiential co-creation implies that each specific biological structure gives rise to unique experiential qualities, the realistic aspect implies that each specific observational perspective further restricts the optional space of perceptually constructible patterns.

Perception has been presented here as an active construction of subjectively stable qualitative patterns in reference to which one can viably coordinate experiences. Then, the subject's shifts of attention present a second-order element of the experiential construction through which one organizes the primarily formed perceptive boundaries into meaningful forms and objects of one’s experience. These shifts are determined by the complete subject's history of inner processes and interactions with the environment. They are also evidently guided by the subject's intentions, anticipations, aspirations and, ultimately, values. By means of an active and dynamic redirection of attention along perceptually available differences in the visual field, one constructs individual stars and their celestial patterns. The primary perceptual qualities in terms of raw experiential differences are thus being co-created at one level, whereas the interpretational construction of the objects of one's experiential reality may be seen as arising at another level. Both processes, however, involve the interplay between the subjective activity of selecting and the previously co-created perceptive outlines that guide one's inner processes of organization of experiences along the line of spontaneous perceptual categorization and reflective thought. Every detail and aspect of one's experience may be, therefore, regarded as a dialogue between mind and nature. Correspondingly, from an idealistic standpoint the subject could consider every experiential detail as a reflection of oneself, while from the complementary realistic standpoint the 'hidden reality' could be seen instilled within every aspect of one's cognition and experience. The subject outlines the starry patterns, and the starry patterns outline her being. Every detail of the subject's experience presents a way that leads her to face not only the reflections of her own understanding, but the reflections of the ontological essence of nature as well. “The stars are beautiful because of a flower that cannot be seen” (Saint-Exupery 1946: 52), the Little Prince said once. These words remind us that both the epistemological foundations of our observations and reasoning and the ontological foundations of nature are the

'hidden guides' of the subject's experiential organization. They are manifested in every detail of the co-created experiential worlds. During their metaphysical dialogue, all features of our experimental worlds come to light.

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