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ON THE EVOLUTIONARY ORIGIN OF VALUES

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Values drive not only human history, but our entire world, i.e. the biosphere. It would seem, therefore, that nothing can be more important for the future of the world than the theory or understanding of values. But in fact, scientific axiology is in a pre-paradigmatic stage of fragmented conceptualizations, i.e. there is no coherent theory of values as causal factors in the living world. Philosophers have reached a relative consensus only in distinguishing intrinsic values as resulting from states of mind or experiences (Narveson, 1967, p. 75; Frankena, 1973, pp. 81–82) from instrumental values, but beyond that there is no coherent conceptualization of other types of value (Nagel, 1979), whose relationship to immanent value usually remains undefined. Therefore, the question arises where do immanent values come from and how they relate to other categories of values.

The concept of value is logically related to the concept of goal, the achievement of which is the *terminal value* and depends on the elements of the environment which, in relation to the goal-directed system (Heylighen, 2023), become carriers of positive or negative *source values* because they have a positive or negative impact on achieving the goal—that is, they are useful or harmful for this purpose. The terminal value results from the configuration of parts of the system, which tends to it by the very nature of this configuration. Therefore this value does not require and cannot be justified by referring to another value—what calls for an explanation is the origin of this particular configuration which automatically confers a new value. As an emergent[1] property of a system, the terminal value is the downward (top-down) cause of its behavior or functioning where the maximization of self-replication is the ultimate cause of the functioning of organisms as biological systems. The terminal value is therefore the Aristotelian *causa finalis*, which must be "good" in order to cause movement or change (cf. Popper, 1945, (II/13), and what is moved or changed is precisely the goal-directed system itself.

[1] In the scientific sense of emergence, see e.g. (Erdmann, Stover, 2000).

Realizing the connection between values and goal-directedness suggests a subdivision of values corresponding to the distinction between two basic forms of goal-directedness: teleonomy as maintained automatically by natural selection, and teleology or intentional purposefulness, evolved on its basis, in which the goals of an action are determined by the values assigned by a subject (see e.g. Rogers, 1964; Sheldon et al., 2003 for human subjects). Hence, the fundamental subdivision of values into two domains: biological or teleonomic values and subjective or teleological values. Most organisms, including the majority invertebrate taxa (with the likely exceptions of cephalopods and decapod crustaceans), operate exclusively in the teleonomic domain in which there are no valuing agents, and both biological values and their involvement in maximizing fitness can be recognized only by us as cognizing subjects.

Only in some of the most highly evolved animals (primarily in the vertebrates) teleology of the subjective domain has superseded teleonomy. However, in most (but certainly not all) non-human subjects teleology is almost entirely limited to achieving immediate goals as determined by value-laden experiences. In the majority of non-human subjects teleology operates at the intuitive, experiential level of awareness which is associative, pictorial, holistic, and does not separate facts from their values. The very experience of an object conveys a value and meaning to it, a value of something desirable or aversive which the subject consciously strives to experience again or to avoid. Most vertebrates probably remain at the level of experiential awareness (Elżanowski, 1993). However, in the apes, especially humans, and probably in the elephants and dolphins as well as in the most intelligent birds (such as the corvids and parrots), the experiential consciousness has to a various extent been evolutionarily superseded by rational, analytical, logical consciousness with an understanding of the cause-and-effect relationship, all of which, together with reflective self-awareness (of oneself as an actor) logically enables and psychologically imposes goal setting, and this in turn leads to self-esteem which depends on individual achievements. Only at this level of consciousness can teleology become partially independent from teleonomy, thanks to which some people are able, with varying degrees of success, to set goals in life that ultimately go beyond[2] and may even interfere with reproductive success.

[2] In this sense anthropologists (e.g., Wierciński, 1988, p. 31) emphasize the human need to feel the meaning of one's life.

TELEONOMIC (BIOLOGICAL) VALUES

The physical world is value-free because it has no goals. The only goal-directed systems on Earth and in the entire known Universe are organisms or systems created by organisms to achieve *their* goals. Values emerged about 3,5 billion years ago with the first biological systems. Once a unique macromolecular configuration, with the ability of self-replication and heritable variability, was created, it automatically (by natural selection) became a goal-directed system permanently maximizing the capability to self-replicate, which is known as Darwinian fitness and measured by the share of copies of a given variant in the next generation. The automatic pursuit of maximizing self-replication conveyed positive and negative biological values to all those factors that, respectively, enabled or hindered self-reproduction, and therefore also survival to a certain stage. The species-specific complex of these factors, with positive or negative fitness values, is known as the ecological niche.

Unknown to most biologists values originated in the biological world. However, even an intelligent agent from space, were it to have visited Earth in the Proterozoic era, would not have guessed that the teleonomy of organisms is a predecessor to our sense of purpose and values. However, this visiting agent would have probably recognized the striving of organisms to maximize self-reproduction, and would have understood the idea of biological values as drivers of this striving—all of which is just a thought experiment that demonstrates the objective nature of biological (teleonomic) values.

In the model of the biological emergence of values as proposed by Damasio (2005), the terminal goal is homeostasis, which "inherently incorporates values in the sense of rejecting those conditions of action that lead to disease and death, and striving for optimal conditions that lead to survival." However, the organismic homeostasis is not an end in itself as is maintained by natural selection, its parameters are set to maximize reproductive success (fitness), and it allows for disturbances if they increase the chance of this success. It seems mistaken to define the goal of an organism in terms of the state of the system. Organisms are dynamical systems that maximize their reproductive success as "a far from equilibrium attractor" (Heylighen 2023), and homeostasis is only an interim goal.

THE ORIGIN OF SUBJECTIVE VALUES

Current science allows us to understand subjective values by showing their neural substrates in the brain (e.g., Berridge, 2003; Panksepp, 1998; 2005) and explaining their origin from biological values. In the course of

vertebrate evolution, objective and measurable biological values have been translated into good (positive which are strived for) or bad (negative which are avoided) experiences, according to their impact on Darwinian fitness. The value of the ultimate biological goal of maximizing the share of offspring in the next generation has been translated, among other things, into sexual pleasures and warm family feelings that motivate helping family members, which increases our inclusive fitness (because we share more genes with family members than with strangers). The values of environmental elements have been translated into negative and other (in addition to family and sexual) positive experiences that have direct motivational significance or play a role as reinforcers in learning (Walker, 1987). In any case, their effect is consistent in sign (valence) and, roughly, in intensity with the biological value of the stimuli. Negative experiences, which at high intensity and/or long duration constitute suffering, are a subjective expression of measurable losses in fitness (Dawkins, 1990). For example, losses resulting from a bodily injury translate into pain, from a predator attack into fear, from the lack of food into hunger, from dehydration into thirst, and from social separation to the specific separation distress known in many social animals. Positive experiences that reinforce consummatory behavior express immediate fitness gains, and experiences those that reinforce activity (e.g. searching for food, exploration) express expected fitness gains.

However, positive experiences tend to become independent from biological teleonomy precisely because for an individual subject they constitute an end in themselves, i.e. they have an immanent value. Pleasure does not require justification: some mammals and birds can engage into pleasant activities, especially play, even as adult individuals, without strictly converting this activity into fitness gains. As a result of the dramatic weakening of natural selection, people can and (as we all know) do increase their experiential balance not only without any connection, but even at the expense of reproductive success.

The translation of biological values into experiential values implies, by the very definition of experience as a conscious perception, the evolutionary *subjectivization* of biological values. The subjectivization of biological values was accompanied by a transition from the teleonomy of hard-wired reflex behaviors to the teleology[3] of motivated behaviors in the strict sense, i.e., behaviors driven by value-laden, positive or negative mental representations of objects and situations. The subjectivization of the biological value of sex-

[3] The fundamental difference between teleonomy and teleology, i.e. between biological goal-directedness and subjectivity, is notoriously blurred in the eco- and biocentric environmental ethics. This is a major confusion of terms because purely biological, reflex organisms (without any dimension of subjectivity), however beautiful, complex and important for their ecosystem, are just devices for DNA replication and as such do not and cannot have any individual interests. Therefore, including them in the scope of ethical regulations on an equal footing with the individual subjects (of lives) is nonsensical and heavily misleading.

ual partners and family resulted in the origin of sexual and family pleasures that promote reproduction. The biological values of environmental factors have been subjectivized as negative or positive experiences that reinforce biologically appropriate behavior vis-a-vis these factors. The subjectivization of one's role in the group produced attributional feelings (Ortony et al., 1988) that arise in agents capable of reflexive self-consciousness and determine or contribute to self-esteem.

The subjectivization of biological values is understandable post factum in evolutionary-biological terms: from a certain level of intelligence (obviously dependent on brain development), the ability to consciously choose from available ways or means to achieve a consummatory act or avoid a danger has become more beneficial than hard-wired (preprogrammed) behavior caused by sequences of reflexes. The initial ability to choose a means or course of action began to confer great selective advantage on any increase in intelligence, thus driving the evolution of the brain in amniotes (Amniota) and some advanced fish (Butler, Hodos, 2005). A similar view is represented by Jaak Panksepp (1994 (1998)), who views the subjectivity as a value coding process that facilitates the learning of new those behaviors by rewarding behaviors that increase fitness and punishing those reducing it.

While the subjectivization of biological values seems easy to explain functionally, i.e. in terms of selective benefits, this transition does not seem amenable to the usual explanation of evolutionary novelties by arranging a sequence of events into a historic causal chain in which each step can be causally explained by the effects of the preceding step. This seems logically impossible in this case because of the fundamental question: how could any objective property of a part or component of the brain (e.g. a neurotransmitter or a group of neurons) possibly cause a positive experience, and therefore a subjective state as the final stage of a cause-and-effect sequence of physicochemical and thus mechanistic events? This question was once asked by Wolfgang Köhler (1944): "How can any sequence of neutral facts, however long and complex, give value as a final product?" The answer is usually silence, including on the part of neurophilosophers. Patricia Churchland (1986, p. 327) simply ignored this problem by categorizing the experience of pain as just another *quale*, no different from the subjective perception of the redness (as opposed to its objective, physically measurable properties such as the wavelength). However, while the neutral or quasi-neutral sensation of redness accompanying the perception of a certain wavelength of light may be accidental to that wavelength because it is irrelevant as long as that wavelength is correctly identified, the negativity and intensity of pain correspond to the biological value of the stimulus and thus aren't and cannot be accidental to the stimulus. They are necessary to recognize the harmfulness of the stimulus and to motivate an appropriate behavioral response.

Thanks to our capabilities to introspection and apperception, we know (or at least we seem to know) that experiences motivate our actions, but we have no idea how they are generated, even if, based on research, we know what (what situations) turns the on and where (in what part of the brain) they arise. We know better and better the neural substrates that translate positive biological values into positive experiences, e.g. the value of food into the pleasure of eating, and negative ones into discomfort and suffering, e.g. the value of threat into fear, but this does not help in understanding the very processes of the subjectivization of these stimuli in either phylogeny or ontogeny or everyday functioning. What we cane observe are the physicochemical processes underlying our value-laden experiences, such as neuronal excitation or the secretion of neurotransmitters, and the behaviors motivated by these experiences, but an experience as such can only be introspected or inferred.

The perceived valence of a single experience corresponds (at least initially corresponded) to the biological valence of the stimulus, which mechanistically leads to the stimulation of appropriate neurons that is to changes in in their configuration, but is incidental to such a configuration of neurons, which in itself can be neither positive nor negative. Therefore, the experienced value must be assigned to it in the same way as a meaning of must be assigned to a word when learning a completely new language (e.g. Hungarian) with unknown word roots that could evoke any correct associations. The difference, however, is that while the word is already a sign, in the subjectivization of a biological value it is a functional configuration resulting from the stimulation of appropriate neurons that is turned into a sign, just as, for example, turning off lights in the house which is a manifestation of the ordinary activity of its inhabitants can be used as a sign (to initiate an action by burglars or police). The subjectivization of biological values undoubtedly has a semiotic aspect, but this does not explain the origin of the receiving mind that is capable to experience the valence of a stimulus.

As a conscious perception, an experience of something is inextricably linked to consciousness of the same object, which is an emergent capacity of the brain (Sperry 1987; Panksepp, 2005). This emergence seems to be even more difficult to understand in causal terms than the preceding major emergence, that is, the origin of life. This is because the valence of any value-laden experience had to be assigned from above to those neuro-configurations that are located in what we now identify as the centers of the limbic (for "punishment") and mesolimbic (for reward) systems. No molecular or cellular neuro-configuration alone could lead to any positive or negative experience before the mind imparted a subjective valence and thus a meaning to it.

The first biological value that was subjectivized in the course of vertebrate evolution was probably the negative value of physical assault and body

damage that was translated by the mind as pain. While it can be explained why any incipient sensitivity to bodily injury could have been amplified by natural selection, the very origin of such incipient sensitivity in the purely reflex animals or Cartesian ancestors of modern vertebrates at some point in animal evolution (Metazoa) remains a mystery. Based on what we know about the emergence of other evolutionary novelties, it is possible that initial experiences arose as an initially nonfunctional byproduct of an evolutionary, adaptive increase of brain complexity, and only then used to convey appropriate subjective meanings to the neural effects of sensory inputs. In any case, value-laden experiences have functional meaning only in combination with a mental representation of the elements of one's environment and one's own body, e.g. the experience of pain requires a mental representation of a body part, and the experience of fear requires a representation of an external object (e.g. an attacker). Therefore, the emergence of experience is dependent on and must have been concomitant to the emergence of phenomenal consciousness that is the awareness of the elements of one's environment and one's own body. However, it is only the emergence of reflective self-awareness that made it possible to experience oneself as an agent, leading to value-laden experience of oneself that builds self-esteem.

In some mammals and birds the subjectivization of biological values led to their *ontification*, i.e., the transformation of a means into an end. Biological values have been subjectivized by natural selection to motivate the pursuit of biologically valuable goals, but once created, a positive experience inevitably became an end in itself for an individual agent. Culture represents the ultimate ontification of the initially adaptive value-laden experience as it enhances the sum of positive experiences by creating objects or behaviors to play with.

CONCEPTUAL VALUES

Human intellectual abilities, particularly causal reasoning and reflective self-awareness, as well as abstract thinking and the verbalization of concepts, enable humans and, to a lesser extent, other hominids, to create a variety of conceptual values. However, it is not a homogeneous category of values. Different conceptual values differ in their relationship to experiential values. Milton Rokeach (1973; 1979) proposed a division of conceptual values into terminal values, defining the desired final states (corresponding to the goal of the system in the terminology adopted here), and instrumental values, relating to whatever is needed in order to reach a terminal value.

Conceptual terminal values, such as well-being, happiness, pleasure, and beauty, arise as a result of apperception, generalization and verbalization of positive experiences. Instrumental values such as justice, freedom, and

moral norms control access to experienced values, and therefore they would not constitute any values if there was nothing inherently valuable to be acquired, shared, or realized (as self-fulfillment). For example, justice is a genuine positive value because this concept means a certain distribution of experienced values that is satisfactory to all. Freedom is a value because it enables making choices and thus self-fulfillment which affects both the immanent and social value of the subject's life (Elżanowski, 2009).

Confusing terminal values with norms leads to grave misunderstandings because terminal values, which define the ultimate purpose of actions, differ from norms in their ontological status. The terminal human values (such as happiness, well-being, self-fulfillment) result from the processes of generalization and apperception of experiences that are generated in the brain which, therefore, constitutes the only known source of subjective values in the Universe. The justification and value of norms derives from the terminal values whereby the value to norms is instrumental. Conceptual instrumental values commonly used in public discourse, such as justice or freedom, are in fact general social norms. There wouldn't be either norms or instrumental values without terminal values, the source of which are experiences in the subjective domain. Unfortunately, any norms, even completely arbitrary and void (not serving any real terminal value) can be inculcated or internalized in the process of induction (Miller et al., 1991; Hoffman, 2000) which employs already existing natural, adaptive value-laden experiences that are being psychotechnically attached to any, even the most absurd, norms as in religious upbringing. As realized by no one less than Henry Sidgwick (1874 (1963)), *the only known and logically possible source of subjective values, including conceptual ones, are experiences, and no value can be created by reasoning alone*. All genuine conceptual values must either represent genuine terminal values which are ultimately based on value-laden experience or, for normative concepts, represent means to reach the terminal values.

Conceptual instrumental values, most often referred to as social and moral values, are used in public discourse as if they were terminal values established by supreme, "transcendental" instances. This is a deeply rooted collective illusion that diverts attention from the real sources of values, shapes social priorities, and thus influences the direction of further biocultural evolution. Conceptual values lead human societies to success or failure (e.g., Diamond 2005) and should therefore be critically analyzed if we want to know where we are heading. Specifically, each concept promoted as a value should be verified in terms of its translatability into experienced values, i.e. ultimately into the value of every (not only human) subject's life. This applies in particular to religious norms, which can be openly harmful, but also to some secular, politically correct slogans, such as cultural diversity, the value of which depends on the social value of mixing cultures, that is, on the impact of each of them on the immanent values of the lives of all in-

dividual subjects (Elżanowski, 2009). Clearly not every increase in cultural diversity is ethically desirable and acceptable. The cultural diversity of the Western world would undoubtedly be increased by inviting cannibals or scalp hunters, just as it is currently increased by those immigrants who consume bushmeat smuggled from Africa or practice religions that promote suicide terrorism or require premortem tormenting of animals in ritual slaughter. Humanity's confusion in matters of values, which to this day are often treated as the domain of religion, is hard to overestimate. The diagnosis once made by Nobel Prize-winning neuroscientist Roger W. Sperry (1972) remains fully valid:

> "If we could summon a crisis counselor [troubleshooter] from space to examine our earthly situation from a perspective of the universe, free from human bias, [...] then on the control panel of our biosphere he would instantly single out the factor of human values as the root cause of most of our problems. Sperry called all of us (including the scientific community) to adopt a new, ecologically responsible ethic, the highest value of which would be the quality of life on Earth" (Erdmann, Stover, 2000).

VALUE ASYMMETRY

The values show asymmetry, at least in their extreme ranges. Biological values may reach absolute minimums (for positive values) or maximums (for negative values). A severe deterioration of living conditions (i.e. reduction of biological values) reduces reproductive success (i.e. terminal value) to zero by death or a total failure of reproduction. However, there can be no absolute value of reproductive success or absolutely positive biological values because the reproductive success of each genotype carrier is, by definition, measured in relation to the success of genotypes. Lineages of variants coevolve in a population by accumulating fitness-maximizing changes. Similarly, species of exploiters (predators and parasites) coevolve with prey and hosts) and many flowering plants coevolve with animals that pollinate them. *Therefore, there are no absolutely positive biological values. An organism, as goal-directed system, strives to maximize the final value*, not to achieve its certain state such as equilibrium as assumed by Damasio (2005). Goal-directedness aimed at maximizing terminal values seems to be the ultimate reason for the asymmetry of values: each biological value (such as the value of a niche element) may assume lethal i.e. absolutely negative values (absolute badness), while the positive values of whatever helps depend on the state of resources and the current condition of competitors and cooperators.

There is asymmetry of negative and positive experiences, too (Walker, 1987, p. 250). In general, i.e. apart from experiences directly related to reproduction (and family), negative experiences are stronger and more ex-

pressive than positive experiences, and also more instinctive, which implies a stronger genetic determination. Negative experiences increase in severity with the strength and duration of the stimulus and reach extreme levels causing irreversible changes and death. By contrast, positive experiences generally increase only up to a certain optimal stimulus intensity and weaken up with long-term exposure. These differences probably result from the control of subjective teleology by biological teleonomy: the more negative the stimulus, the greater the threat and the more it needs to be counteracted, while pleasures that would be proportional to the intensity and duration of stimulation could lower the fitness due to the depletion of resources (time and energy) and weaken motivation for the everyday activity that is necessary for survival. For example, by artificially exciting the brain reward (mesolimbic) system, rats delve into the pleasure as to become extremely exhausted (Rolls, 1975), which demonstrates the known danger of uncontrolled releasing teleological mind from the control of teleonomic goal-directedness (as in drug addiction).

Conceptual values are asymmetric as well. The universal and absolute calamity caused by a planetary catastrophe is, unfortunately, quite real and remains within the reach of current technological possibilities. However, universal and absolute happiness is utterly utopian even in principle—if everyone were permanently and perfectly happy, no one could even realize it and there would be no concept of happiness. Strikingly asymmetric are the conceptual instrumental values. Extreme injustice—such as once towards slaves and now towards the overwhelming majority of non-human subjects—is extremely wrong and evil. However, full and absolute justice is unattainable even in principle (as opposed to religious delusions) as well as absurd—even if it were limited only to people, it would require a uniform population of identical twins with the same capabilities, needs and vulnerability, as well as a system of compensation for all possible injustices, even those resulting from purely random causes! The utopia of absolute justice has a direct practical impact on political programs, which should aim at limiting injustice and not at the inherently unattainable perfect justice.

The asymmetry of positive and negative ranges of conceptual values is especially manifest in the case of freedom and tolerance: while extreme enslavement and extreme intolerance are clearly evil, their absolute opposites would grant the freedom of action to all sorts of criminals and fraudsters (after all, a permanent component of human populations), demagogues (secular and ecclesiastical), bigots and upstart dictators. In this way, the absolute freedom and absolute tolerance would lead to tyranny and intolerance, which is what Popper (1945) called the paradox of freedom and the paradox of tolerance, respectively. However, these are only special cases of the obvious dependence of conceptual instrumental values on the real experienced values. For example, the value of freedom depends the value of what

it is used for, and the value of tolerance on what is tolerated. A broader societal discussion of these paradoxes is evidently avoided because it inevitably leads to a confrontation of a truly universal ethics which must be based on the science-informed placement of humans among other subjects (agents) inhabiting the planet Earth (Elżanowski, 2009) with the anachronistic doctrine and rhetoric of human exceptionalism which largely comes down the belief in the extraordinary, inherent, species-specific dignity that is unjustifiably granted to all humans and only to humans (Rachels 1991) and mixed, to bad effect, with civil rights.

The asymmetry of negative and positive subjective values is related to their successive, asynchroneous origin, which in turn may result from the asymmetry of biological values. The first negative experiences to arise in evolution were probably pain, the primary center of which, the reticular formation (*formatio reticularis*), is also the primary motor center and is located in the phylogenetically oldest part of the brain (brain stem), although the view has also been expressed that fear is the oldest experience in evolutionary terms. Positive experiences may have originated either independently, with the reward for foraging and/or ingesting food being the primary candidate, or as a complement to negative experiences on the principle of emotional contrast, which means that the mere cessation of a negative experience is felt positively as a relief. Some conceptual values were also created on a similar basis, e.g. the values of freedom and tolerance were apparently created as the logical opposites of extremely negative states of oppression and bigotry, and not as generalizations based on the collective experience of these ideals. This explains, to some extent, the poor understanding of their ideal or virtual nature and their uncritical usage in social sciences and political rhetoric.

FINAL REMARKS

The vertebrate brain is so far the only known source of subjective values, although there are observations suggesting that consciousness and subjectivity may have also arisen in some other phylogenetic lineages of animals. The conceptual values (commonly known as values) do not make any sense and thus would not have arisen without experienced values generated in the brain. All conceptual values are secondary to experience: (1) logically, because they are concerned with the distribution and/or access to experienced values; (2) phylogenetically because value-laden experience or simply feelings clearly preceded any apperception and conceptualization; and (3) ontogenetically because in individual development they appear long after experiences and only then can they be internalized using already existing experiences.

Science has made great progress both in locating the substrates of subjectivity, especially in the mammalian brain, and in understanding the biological significance of values. However, the very mechanism of the evolutionary emergence of subjectivity and mind (generated in some way by the brain) may turn out to be an intellectual challenge that is as difficult as the understanding of the Universe, inasmuch as both problems concern attempts to understand the logic of systems from the position of its users, i.e. from the inside. Understanding the subjectivization of biological values or proving that it is impossible to understand in principle (e.g., because it is impossible to causally explain what is available only through introspection) will have important consequences for the scientific worldview. Just as the theories of natural selection and relativity were the greatest discoveries of the 19th and 20th centuries, respectively, the scientific understanding of values and consciousness has a chance to be the biggest issue in the 21st century.

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