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Beyond Neurocentric Psychiatry: An Analysis of Fuchs' Enactive–Ecological Concept of the Mind

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Research into the brain sciences has received an explosive growth in funding and attention from academia, industry, healthcare institutions, media, and general public in the last decades. The Human Brain Project, for instance, is one of the two largest scientific research projects that the European Union has ever funded, while the BRAIN Initiative is an ambitious project supported by public and private sectors in the United States. It is undeniable that plentiful scientific advancements have been achieved regarding the neurobiology of mental processes and illness during these last decades. However, this enthusiasm for the brain has led to a view where the whole spectrum of mental phenomena is explained appealing to a complex network of neurons, synapses, neurotransmitters, and hormones. Under this picture, subjectivity has been largely seen either as identical to neurobiological processes or as no more than epiphenomena without any causal power, while the body and the environment have been portrayed as just a source of inputs to be processed by this powerful computing machine that is the brain.

In *Ecology of the Brain*, Thomas Fuchs takes a stance against this "brain-centered view of human beings" [p. xiii][1] that has become prevalent in many disciplines and is quickly infiltrating our everyday self-understanding. He rightly acknowledges

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[1]All Fuchs' (book reviewed) page numbers appear in brackets.

that this dominant perspective provides an image of persons as controlled by their brains. Under this view, "[t]he brain seems well capable of performing its computational tasks without any involvement of the human subject" [p. xiv]. Fuchs makes the case clear that this reductionist perspective is relegating subjectivity from scientific explanations of the mind, leaving reasons, motives, experiences of agency, and all other subjective states out of the chain of causal processes that give rise to action. In this regard, he argues that consciousness is by no means powerless, but has important functions, since it "enables an integration of space, time, and self that is not found in the physical world and multiplies the possibilities of living beings to cope with the environment and to preserve themselves" [p. 62]. However, as we will see in the next section, he does not conceive subjectivity as a non-physical phenomenon, but as an embodied and extended one.

Fuchs provides arguments for the irreducibility of subjectivity and intentionality to physiological facts, and points to the category mistakes that result from ascribing to the brain the authorship of many human activities: "If one reads neuroscientific literature, one can almost come to the conclusion that the brain genuinely calculates, believes, interprets, construes hypothesis, recognizes, and decides" [pp. 43–44]. It is the embodied person, Fuchs repeatedly claims, the living being as a whole — and not the brain or some of its parts — that is the locus of perception, emotion, thought, and action.

He also argues against a *neuroconstructivist epistemology* that results from this brain-centered perspective. The target of his critiques in this respect is the "almost taken-for-granted view that reality can be found in the head" [p. 3]. He evidences the paradoxical legacy of idealism in the epistemology of neurosciences in so far as it negates the possibility of having a direct contact with the outer physical reality. According to this view, which has been widespread among neuroscientists and neurophilosophers (e.g., Eagleman, 2011; Metzinger, 2009), we can only have access to the representations, models or simulations of the world that our brain constructs, since "[t]he real world is a rather bleak place of fields of energy and movements of particles, without any qualities whatsoever" [p. 4]. Drawing from Husserlian phenomenology and enactive cognitive science (Di Paolo, 2009; O'Regan and Noë, 2001; Thompson, 2007; Varela, Thompson and Rosch, 1991), Fuchs defends the idea that "[w]e must be physically in the world, be related to it, be able to move and act in order to perceive anything at all" [p. 9]. Accordingly, he does not take perception as an achievement of a brain, but of a sensing and moving embodied subject situated in an intersubjective world that presents itself as available for interaction.

Another central critique that Fuchs makes to the prevalent view in neurosciences is that it "neglects the *reciprocal relationships and circular processes* in which the brain is embedded. This would be analogous to an attempt to understand the heart without considering circulation, or the lungs without observing the breathing cycle" [p. 67]. Therefore, his strategy is not to deny the relevance of

the brain for our mental life, but to provide an interpretation of its role within an "ecological theory of the living organism" [p. xviii]. Hence, his contribution is not only a timely critique to a reductionist view of the mind (Chapters 1 and 2), but also a novel and compelling alternative to it (Chapters 3–6) that has important implications for psychiatry and psychological medicine (Chapter 7). In a provocative way, Fuchs states that "in isolation, the brain would be just a dead organ" [p. xvii]. It is only in interaction with the rest of the body, the environment and other people that its role comes to be properly understood: the brain functions as "an organ of *mediation* and *transformation*" [p. 68]. Fuchs' basic toolkit for exploring this central idea includes phenomenology, philosophical biology, dynamical systems, affective neurosciences, and an embodied–enactive approach to cognition.

Summary of the Arguments

Two main theses are at the core of this book. According to the first thesis (Chapters 3, 4, and 6), "all the brain's functions are dependent on *the human person's unity as a living organism* and may only be comprehensible on this basis" [p. xviii]. This thesis is based on the phenomenological notion of "embodied subjectivity," which offers a view of the living organism as a dialectical unity of two complementary aspects: a "physical body" (*Körper*) and a "lived body" (*Leib*). The physical body is the body seen from a third person perspective, in "the naturalistic attitude" [p. 247], as an object in the world. This is precisely the attitude that scientists take when looking at the body's anatomical structures and physiological processes. This is also the aspect that we grasp when our body is somehow alienated from us due, for example, to a physical injury or an illness. However, drawing from phenomenology, Fuchs suggests that the way in which we primarily grasp ourselves and others is not through an objectivizing attitude, but "under the aspect of [the body's] holistic aliveness that is manifested both subjectively as well as intersubjectively" [p. 75], i.e., as a lived body that encompasses "lived experience *and* expressive behavior" [p. 82]. This is what Fuchs calls "the personalistic attitude" [p. 247]. Importantly, subjectivity is not seen here as a pure mental phenomenon, but as "always embodied and related to the environment, being present and effective within it" [p. 93].

Fuchs takes the enactive conception of living organisms as adaptive, self-organizing autonomous systems (Di Paolo, 2005, 2009; Thompson, 2007; Varela, 1979, 1997; Weber and Varela, 2002) as a basis for his account on what he calls "the dual aspectivity of living beings" (Chapter 3). According to the enactive approach, organisms generate and actively maintain a biological identity as an operationally closed organization of metabolic processes. Although autonomous, this organization depends on material and energetic exchanges with the environment, so it needs to be open to it. In this regard, organisms are far-from-thermodynamic equilibrium systems, and this condition renders their existence precarious. In order to preserve themselves, organisms must be able to distinguish "favorable and adverse

circumstances in the environment" [p. 86]. In this way, they establish a relation of *sense-making*, turning "the merely physical surroundings into an environment of significances and valences" [p. 86]. Sense-making implies a basic form of affectivity, "in the sense that the living being is a subject of *concern* and thus never indifferent to its existence and environment" [p. 91]. The enactive approach thus provides Fuchs with a theoretical framework for his view of living being's embodiment as implying not only a series of physiological and metabolic processes, but also a form of subjectivity: "*in the same measure as subjectivity is necessarily embodied, so too, a suitably organized, living body is necessarily subjective*" [p. 93].

The concept of dual aspectivity is proposed by Fuchs as a way out of the debate around the mind–body problem in contemporary philosophy of mind (Chapter 6), which forces a choice among (1) a non-physical mind with causal powers in the realm of physical phenomena, which implies that the physical world is not causally closed; (2) a non-physical mind with no causal powers in a causally closed physical world; and (3) a mind that is identical to the brain. Fuchs calls for a reconceptualization of the mind–body problem under a non-dualistic, yet non-reductionist framework in which the mental and the physical "*are irreducible, and yet ontologically inseparable*" [p. 230]. This framework entails, on the one hand, that the phenomena of consciousness are not immaterial phenomena belonging to an inner subjective world, but a life process that involves the whole person in interaction with its environment; and on the other hand, that the physicalist picture of the world is incomplete, since it excludes "the emergence of higher function levels" [p. 221] with causal impact over the lower levels from which they arise. In relation to this last point, Fuchs appeals to a "*strong version of emergence*" [p. 221] that requires (1) the primacy of holistic functions over the bodily components and (2) the reciprocity of downward and upward causality (see next paragraph on circular vertical causality).

Another notion that is central in Fuchs' ecological theory of the brain is that of *circular causality* (Chapters 4, 6, and 7), a kind of causality characteristic of life that differs from the monolinear physical causality that is prevalent in neurosciences. Fuchs argues that two forms of circular causality are present in living organisms: a *vertical causality* within the organism and a *horizontal causality* between the organism and its environment. Vertical circular causality involves both a top–down or downward causality, in which the living system exerts a structuring influence on its parts, and a bottom–up or upward causality, in which the parts and partial processes enable the maintenance and functioning of the whole system. Interestingly, Fuchs argues for an understanding of downward causality not as an efficient, proximal cause, but as a formative influence exerted "by the conscious human being *as a whole*" [p. 226]. By formative influence, he means that "the superordinate dynamics of the system *constrain* the behavior of the components so that they no longer have the same behavioral alternatives open to them as they would have outside the system" [p. 223]. In this regard, he proposes that one of the

functions of the brain is the transformation of "encompassing or high-level states (e.g., intentional directedness) and low-level (e.g., neurochemical) micro-states of the organism," rendering them "effective on the other hierarchical level" [p. 98].

Fuchs also makes the case for a more basic function of the brain that involves the regulation and integration of the inner milieu in which it is embedded, resulting in a vague background "*feeling of being alive*" [p. 72] that "emerges from the autonomous regulatory processes of the organism and provides the continuous background as well as the driving force for all higher cognitive functions" [p. 110]. Fuchs thus defends a view of consciousness as originating from vital regulatory processes involving the brainstem and the entire organism. However, he does not claim that consciousness is localized within the organism. Instead, in his ecological model, he proposes that "[c]onscious experience in its full sense *only arises in the overarching system of organism and environment*, on the basis of the dynamic interaction of various components, of which the central and peripheral organs are parts equally as much as the suitable 'counterparts' in the environment" [p. 135].

This leads to the second kind of circular causality: horizontal circular causality, which involves "the feedback relationships and functional cycles of *organism and environment*" [p. 98]. Fuchs regards organism and environment as an overarching system that constantly reconfigures itself through a history of interactions. Accordingly, the relationship between them under Fuchs' theory is not one of internal representation, since perception "does not provide images or models but *opens up action possibilities* for a moving, embodied, and situated creature" [p. 133]. Drawing from the enactive sensorimotor theory of perception (O'Regan and Noë, 2001; Thompson, 2005), Fuchs regards perception as "a skillful activity of the organism, which is shaped by (1) *sensory variance contingent on movement* and (2) the *implicit, practical knowledge of an object*" [p. 130]. According to Fuchs, this practical knowledge is acquired through a process of sedimentation or incorporation of experiences in the plastic neural structures of implicit memory. The role of the brain thus consists here in "transforming repeatedly occurring links between organism and object into sensorimotor couplings" [p. 131]. As a result of this transformation, "experiences become organic dispositions, habits, and schemata of interaction" [p. 140], which are regarded by Fuchs as neural "*open-loops*" or "*patterns of neuronal excitability*" that "*are completed by the interactive coupling of organism and environment*" [p. 147].

Fuchs recurs to the notion of "*Vorgestalt*" or "pre-gestalt" to refer to the image and action schemes that are formed through the process of sedimentation and "that prefigure the successful sensorimotor coupling of organism and environment" [p. 155]. These schemes are seen as dynamic preconceptions and bodily protentions that are matched by the complementary elements in the environment or realized through the appropriate movements, thereby actualizing the functional cycles. This part of the book is perhaps one of the most difficult and obscure. Fuchs emphasizes that *Vorgestalt* is not a representation, but he is not clear about

what this pre-gestalt is and how the matching is performed. He explains that the brain functions as "*an organ of resonance*" [p. 166] in the sense that neural patterns "resonate with environmental stimuli in a coordinated manner" [p. 165]. However, his account of how this resonance might take place is far from clear. Also confusing is his use of computationalist terms that he wants to avoid, such as incoming signals that are "analyzed" in specialized brain areas and "matched with stored neuronal patterns" [p. 151]; the recognition of objects "based on stored image schemas" [p. 153]; or the "storing of […] motor sequences in the basal ganglia" [p. 154].

According to Fuchs, vertical and horizontal circular causality are intertwined in *integral causality*, which is based on perceptual and motor capacities that form through implicit memory. On the one hand, these capacities "bundle sub-systems and organs together in vertical causality to form cooperative units that are available to accomplish different functions" [p. 100]. On the other hand, they remain as *open-loops* that "*actualize* themselves as soon as a suitable situation arises," connecting with "complementary counterparts of the environment in *horizontal feedback*" [p. 100].

The second thesis (Chapters 5, 6 and 7) states that "all higher brain functions presuppose the *human being's enactment of life in a shared social world"* [p. xviii]. Drawing mainly from developmental and social psychology, Fuchs highlights the critical influence of the sociocultural environment in the ontogenetic development of the human brain, all the way from the dyadic relationship between mother and child that starts in the fetal period to the acquisition of language. Brain plasticity also plays a fundamental role here, since the impressions that children receive in the prenatal stage and the intercorporeal relations with others from birth onwards become sedimented in their neural systems as implicit memory, shaping their future preferences, capacities, and interactions. Fuchs further argues that the human brain has been evolutionarily shaped to be *a social organ*. To exemplify this, he appeals to two biologically grounded systems: the attachment system, "which has the function of securing care and closeness of the caretakers" [p. 183], and the mirror neuron system — that he prefers to call the *neural resonance system* — which "intermodally connects interpersonal perception with one's own movement" [p. 187], contributing to understanding others.

Fuchs provides a compelling socio-pragmatic account of the development of language and reflexive thought "primarily by means of *shared social practices* which are sedimented in the structures of the brain" [p. 192]. Under this perspective, children start learning words as vocal gestures that complement an adult's pointing gestures. In the course of interaction, a neural coupling is progressively produced between the pointed object, the related sound, and the action elicited by the object. As a consequence, "*the originally only accompanying sound becomes capable of evoking the intended object and the object-related action scheme in the listener.*" By activating common neural patterns in listener and speaker, the word

becomes "an *intersubjective symbol*" [p. 199]. Hence, on this account, the brain does not function in language learning as storage of meanings, but as "an organ of mediation that increasingly matches the heard words with neuronal patterns related to action, interaction, and object experiences" [p. 200].

In Fuchs' account, the internalization of vocal gestures gives rise to reflexive thought as "a form of inner speaking" [p. 202]. This includes the internalization of the parental "No!" in the form of "opposing inner voices, in which the child confronts itself in an evaluative manner" [p. 203]. In this way, Fuchs accounts for the origin of self-control or "executive control functions," which require "a sufficient amount of socialization experiences" [p. 204] to develop. According to Fuchs, the capacity for self-control enables a libertarian kind of free will, which he calls *embodied freedom*, by opening

> a space for thinking and imagining, where I am free to move among possibilities without factual constraints. This space of possibilities arises from an *inhibition*: we possess the capacity *to suspend* our own impulses and desires, to pause for thought, and test whether and in what way we convert them into actions. [p. 238]

Contemporary debate around free will is one of the clearest examples of the trend in neurosciences to posit persons as controlled by their brains. Following research by Libet et al. (1983), the folk belief in free will — based on our sense of agency or experience that our subjectivity is causally effective in producing our actions — has tended to be considered as a systematic illusion resulting from our ignorance regarding the subpersonal processes and mechanisms that actually cause behavior (Bargh, 2008; Gazzaniga, 2011; Wegner, 2002). Fuchs criticizes the experiments used against free will for focusing on short time episodes of pre-selected motor reactions that constitute "only one small part in the entire intentional arc of human freedom" [p. 240]. He argues for a notion of decision-making as a time-spanning, "dynamic process of evaluating and self-questioning" [p. 239] that expresses many aspects of our personality. Although his notion of freedom is akin to the libertarian notion of "agent causation," he does not assume an "'unmoved mover' or independent initiator of a novel chain of events" [p. 241]. Instead, he depicts an embodied subject that "contains and integrates its history, its emotional dispositions, motives, and intuitive evaluations, which all enter into the dynamical process of decision-making" [p. 241]. Although Fuchs challenges determinism, he does not presuppose decisions occurring by chance: "all that is needed is the presupposition that the course of the world or of brain processes […] is *not completely determined* for all future" [p. 243].

As can be seen in this summary, *Ecology of the Brain* is a far-reaching book that touches on multiple topics and can be taken from many different directions, such as the emergence of subjectivity from a self-organizing autonomous living system; the metaphysical implications of the concept of dual aspectivity; the formation and deployment of capacities through body memory; an alternative

theory of perception and action based on the notions of patterns and resonance; an embodied and extended conception of consciousness; the integral causality that distinguishes life; the social constitution of language and reflexive thought; and the development of the notion of embodied freedom. In this section, I tried to go briefly through the most relevant topics from this book. In the rest of this review, I will concentrate on the implications of Fuchs' approach for psychological medicine that he develops in Chapter 7.

Mental Disorders Are not Brain Disorders

This book makes a valuable contribution to the field of psychological medicine by proposing an ecological conception of mental disorders as a much-needed alternative to the "current neuroreductionist trends in psychiatry" [p. 251]. Fuchs launches a frontal attack against the conception of mental disorders that has prevailed in psychiatry since its biological turn (e.g., Insel and Quirion, 2005; White, Rickards, and Zeman, 2012), which he characterizes with three terms: (1) *reductionism*, since mental disorders are reduced to brain disorders; (2) *reification*, since they are said to be equivalent to a dysfunction localizable in some part of the brain; and (3) *isolation*, since they are considered as separated from the patients' relationship with their environment. As Fuchs makes clear throughout this book, he does not deny the role of the brain for mental phenomena — and hence for mental disorders. However, he stresses that brain dysfunctions are not sufficient for explaining mental disorders, since "[a] change in local metabolism […] is only one, albeit a key *component* in the circular processes of the illness" [p. 266]. Fuchs points to the imminent risk of losing the subject-oriented perspective in psychiatry and emphasizes the need for developing "an overarching paradigm that is able to found psychiatry as a relational medicine in an encompassing sense: *as a science and practice of biological, psychological, and social relations and their disorders*" [p. 255]. And this is precisely the endeavor that he undertakes in this part of the book.[2]

Fuchs illustrates his theory through examples from depression, obsessive–compulsive disorder, schizophrenia, anxiety, and post-traumatic stress disorder. I suggest that the ideas developed in this chapter are also relevant for addictive disorders and could be a focus for further research. Following the neuroreductionist

[2] The need for an integrative approach in psychiatry had been already recognized by the advocates of the biopsychosocial model (Engel, 1977), which emerged as a reaction to the medical model of disease. Fuchs regards the biopsychosocial model as lacking an adequate integration between the biological, the psychological, and the sociological, "resulting in an eclecticism of factors" [p. 255]. He thus offers his ecological approach as an alternative. Although a more detailed account of the differences between both approaches would have been appreciated, the fundamental advantage of Fuchs' ecological approach seems to be that it does not face the problem of integrating various separated factors, since it "conceives brain, organism and environment in their dynamical unity" [p. 255].

trend that Fuchs criticizes, the prevalent view on addictions is currently based on a brain disease model (Leshner, 1997) that was proposed in 1997 by the United States National Institute of Drug Abuse. According to this model, addictions are understood in terms of dysfunctional neural networks (Everitt and Robbins, 2016), such as those underlying reward-related learning and memory (e.g., Hyman, 2005; Hyman and Malenka, 2001) and self-control (e.g., Baler and Volkow, 2006; Goldstein and Volkow, 2002). Although some authors have questioned this model (e.g., Hall, Carter, and Forlini, 2015; Heyman, 2009; Levy, 2013; Lewis, 2015; Pickard, 2012; Tekin, Flanagan, and Graham, 2017), most research and treatments are still based on it.

In contrast to this brain-centered perspective, mental disorders in Fuchs' ecological theory are conceptualized as circular processes involving the physical body, the lived body, and the person's interpersonal relations. Fuchs' proposal is that mental disorders are disruptions in vertical and horizontal circular causality that are mediated by the brain, but cannot be reduced to a brain dysfunction. In the first case, the disruption occurs in "the interplay between lower-level processes and higher capacities of the organism" [p. 256]. In the case of addictions, this disruption can of course be portrayed in neurobiological terms as, for example, a dysfunction in the mesolimbic dopamine systems (Robinson and Berridge, 1993). Nonetheless, according to Fuchs, a mental disorder "primarily affects a person's *self-experience,*" and this subjective aspect should not be regarded as "a secondary reaction to physiological dysfunctions" [p. 257]. He argues that changes in the lived body and the person's self-relationships exert a decisive influence in the course of the disorder, including a top–down influence in biological processes. For instance, in depression, the disruption could give rise to negative self-evaluations that "become self-fulfilling prophecies, thus increasing the likelihood of further failures and reinforcing the […] condition" [p. 258].

This is important for addictive disorders, which have been largely construed as "a sub-personal brain chemistry phenomenon" (Tekin et al., 2017, p. 223), leaving the personal level aspects out of the story. The disease model emerged as a way to avoid stigmatization and secure treatment for addiction (Leshner, 1997). However, by taking a brain-centered approach, this model has missed what Fuchs calls the "*substance*" of mental disorders*,* that is, "*the patient's changed self-experience and self-relationship*" [pp. 257–258]. Although the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) acknowledges the subjective aspects of addiction, "in practice the emphasis is very much on physical dependence over any psychological or experiential explanation" (Kemp, 2018, p. 2). Additionally, most neurobiological theories of addiction are based on animal models (Heather, 2017), which according to Fuchs are limited because they do not account for the "unique, specifically human kind of vertical circular causality, namely the feedback from subjective perceptions and evaluations into more basic processes of the illness" [p. 259]. In this regard, Fuchs emphasizes the importance of a "subject-oriented

psychopathology based on a phenomenological and hermeneutical approach for psychiatry and psychotherapy" [p. 277]. While a significant body of work has been done in the phenomenology of mental disorders such as depression (e.g., Fuchs, 2013; Ratcliffe, 2015) and schizophrenia (e.g., Fuchs, 2005; Sass and Parnas, 2003), research focused on the phenomenology of addiction is scarce (Schütz, Ramírez–Vizcaya, and Froese, 2018).

In relation to horizontal circular causality, Fuchs emphasizes that mental disorders cannot be viewed as disorders of isolated individuals detached from their social interactions and relationships. He goes as far as proposing that mental disorders can also be characterized as *"communicative disturbances*" [p. 260], since they crucially involve impairments in social responsivity, i.e., impairments "to respond to situations, offers, and demands of the social world in a flexible and autonomous manner" [p. 260]. This lack of social responsiveness "essentially jeopardizes the ecological foundation of psychic stability: human beings are intrinsically dependent on the resonance of their actions within the social context" [p. 262]. Disturbances in social responsivity lead to dysfunctional relationships, which have negative feedback effects on the progression of the disorder. Other social factors, such as "experiences of backlog or defeat, poverty, social exclusion, or isolation" [p. 263] also trigger or aggravate mental disorders.

The effects of social interactions on addiction were acknowledged by Alexander, Coambs, and Hadaway (1978) in their famous experiment known as Rat Park, in which morphine-addicted rats that were kept in isolation increased their morphine consumption after an abstinence period, while those that were socially housed decreased it and preferred plain water instead. In recent years, some authors have called for attention to the "social conditions [that] influence the etiology of addiction" (Heyman, 2009, p. 32). In this regard, Levy (2013) asserts that "[i]f we are to understand addiction and respond appropriately to it, we must not focus on just the addicted individual herself, much less her brain. Our focus must be on her, in her social setting" (p. 6). However, current research on addictions has taken mainly an individualist stance (Levy, 2013; Zautra, 2015), abstracting the individual from her micro-social and macro socio-cultural contexts.

This ecological theory has important consequences for the treatment of mental disorders that should also be taken into account for developing more effective and integral treatments of addiction. According to Fuchs, somatic and psychological therapies must be seen as having an effect on both physiological and experiential aspects, "since any mode of treatment will be transformed by the brain and thus contribute to a holistic effect" [p. 268]. On the one hand, pharmacological therapy aims at restituting the neurobiological system to its starting state, but this restitution corresponds "to an indirect influence on subjective experience" [p. 270]. On the other hand, psychotherapy is directed at the experiential aspect of patients, but it also has "the potential to modify brain function across a range of different psychopathological conditions" [p. 271]. However, Fuchs distinguishes between

both kinds of treatments. First, he makes it clear that the neuronal changes resulting from pharmacological treatments are reversible, since these treatments by themselves do "not essentially anchor a new disposition for experiences and behavior"; they only provide the conditions for the patient "to adopt a certain mode of behavior within the social context that reinforces the effect via feedback" [p. 274]. Second, he points out that the changes resulting from psychotherapy cannot be identified with neuronal changes, since psychotherapy aims at transforming implicit behavioral and relational patterns that "are incorporated in the patient's bodily existence, in his attitude, patterns of movement, expression, and behavior, and they are also manifested in the structures of his lived space and relationship sphere" [p. 273]. Fuchs proposes changing habitual dispositions as the most effective way to tackle mental disorders. For doing this, he calls for a "polyperspectival approach" that combines "various, especially somatic, psychotherapeutic and social psychiatry approaches […] to influence circular causalities" [pp. 276–277]. He thus suggests body-oriented and ecological psychotherapy as "especially suitable for overcoming the still prevailing concept of a psychic or cerebral inner space, and to characterize the patient in terms of his or her concrete and bodily *being-in-the-world*" [p. 273]. A final moral to keep from this book is that "[a] biological psychiatry in the appropriate sense" needs to rely on "an ecological theory of biology that integrates the social and cultural processes outside the brain, even though these are functionally sedimented in genome and brain structures" [p. 276].

References

Alexander, B. K., Coambs, R. B., and Hadaway, P. F. (1978). The effect of housing and gender on morphine self-administration in rats. *Psychopharmacology, 58*, 175–179.

Baler, R. D., and Volkow, N. D. (2006). Drug addiction: The neurobiology of disrupted self-control. *Trends in Molecular Medicine, 12*(12), 559–566. doi:10.1016/j.molmed.2006.10.005

Bargh, J. A. (2008). Free will is un-natural. In J. Baer, J. C. Kaufman, and R. F. Baumeister (Eds.), *Are we free? Psychology and free will* (pp. 356). New York: Oxford University Press.

Di Paolo, E. A. (2005). Autopoiesis, adaptivity, teleology, agency. *Phenomenology and the Cognitive Sciences, 4*, 429–452. doi:10.1007/s11097-005-9002-y

Di Paolo, E. A. (2009). Extended life. *Topoi, 28*, 9–21. doi:10.1007/s11245-008-9042-3

Eagleman, D. (2011). *Incognito: The secret lives of the brain*. New York: Pantheon Books.

Engel, G. L. (1977). The need for a new medical model: A challenge for bio-medicine. *Science, 196*(4286), 129–135. doi:10.1126/science.847460

Everitt, B. J., and Robbins, T. W. (2016). Drug addiction: Updating actions to habits to compulsions ten years on. *Annual Review of Psychology, 67*(1), 23–50. doi:10.1146/annurev-psych-122414-033457

Fuchs, T. (2005). Corporealized and disembodied minds: A phenomenological view of the body in melancholia and schizophrenia. *Philosophy, Psychiatry & Psychology, 12*(2), 95–107.

Fuchs, T. (2013). Depression, intercorporeality and interaffectivity. *Journal of Consciousness Studies, 20*(7-8), 219–238.

Gazzaniga, M. S. (2011). *Who's in charge? Free will and the science of the brain*. New York: HarperCollins.

Goldstein, R. Z., and Volkow, N. D. (2002). Drug addiction and its underlying neurobiological basis: Neuroimagining evidence for the involvement of the frontal cortex. *American Journal of Psychiatry, 159*(10), 1642–1652. doi:10.1176/appi.ajp.159.10.1642

Hall, W., Carter, A., and Forlini, C. (2015). The brain disease model of addiction: Is it supported by the evidence and has it delivered on its promises? *The Lancet Psychiatry, 2*(1), 105–110. doi:10.1016/S2215-0366(14)00126-6

Heather, N. (2017). Is the concept of compulsion useful in the explanation or description of addictive behaviour and experience? *Addictive Behaviors Reports, 6*, 15–38. doi:10.1016/j.abrep.2017.05.002

Heyman, G. M. (2009). *Addiction: A disorder of choice*. Cambridge: Harvard University Press.

Hyman, S. E. (2005). Addiction: A disease of learning and memory. *American Journal of Psychiatry, 162*(8), 1414–1422. doi:10.1176/appi.ajp.162.8.1414

Hyman, S. E., and Malenka, R. C. (2001). Addiction and the brain: The neurobiology of compulsion and its persistence. *Nature Reviews Neuroscience, 2*(10), 695–703. doi:10.1038/35094560

Insel, T. R., and Quirion, R. (2005). Psychiatry as a clinical neuroscience discipline. *Journal of the American Medical Association, 294*(17), 2221–2224. doi:10.1001/jama.294.17.2221

Kemp, R. (2018). Addiction as temporal disruption: Interoception, self, meaning. *Phenomenology and the Cognitive Sciences*, 1–15. doi:10.1007/s11097-018-9578-7

Leshner, A. I. (1997). Addiction is a brain disease, and it matters. *Science, 278*(5335), 45–47.

Levy, N. (2013). Addiction is not a brain disease (and it matters). *Frontiers in Psychiatry, 4*, article 24, 1–7. doi:10.3389/fpsyt.2013.00024

Lewis, M. (2015). *The biology of desire: Why addiction is not a disease*. New York: Public Affairs.

Libet, B., Gleason, C. A., Wright, E. W., and Pearl, D. K. (1983). Time of conscious intention to act in relation to onset of cerebral activity (readiness-potential): The unconscious initiation of a freely voluntary act. *Brain, 106*, 623–642.

Metzinger, T. (2009). *The ego tunnel: The science of the mind and the myth of the self*. New York: Basic Books.

O'Regan, J. K., and Noë, A. (2001). A sensorimotor account of vision and visual consciousness. *Behavioral and Brain Sciences, 24*(5), 939–973. doi:10.1017/S0140525X01000115

Pickard, H. (2012). The purpose in chronic addiction. *AJOB Neuroscience, 3*(2), 40–49. doi:10.1080/21507740.2012.663058

Ratcliffe, M. (2015). *Experiences of depression: A study in phenomenology*. Oxford: Oxford University Press.

Robinson, T. E., and Berridge, K. C. (1993). The neural basis of drug craving: An incentive–sensitization theory of addiction. *Brain Research Reviews, 18*(3), 247–291. doi:10.1016/0165-0173(93)90013-P

Sass, L. A., and Parnas, J. (2003). Schizophrenia, consciousness, and the self. *Schizophrenia Bulletin, 29*(3), 427–444. doi:10.1093/oxfordjournals.schbul.a007017

Schütz, C. G., Ramírez–Vizcaya, S., and Froese, T. (2018). The clinical concept of opioid addiction since 1877: Still wanting after all these years. *Frontiers in Psychiatry, 9*, article 508, 1–6. doi:10.3389/fpsyt.2018.00508

Tekin, Ş., Flanagan, O., and Graham, G. (2017). Against the drug cure model: Addiction, identity, and pharmaceuticals. In D. Ho (Ed.), *Philosophical issues in pharmaceutics: Development, dispensing, and use* (pp. 221–236). Dordrecht: Springer.

Thompson, E. (2005). Sensorimotor subjectivity and the enactive approach to experience. *Phenomenology and the Cognitive Sciences, 4*(4), 407–427. doi:10.1007/s11097-005-9003-x

Thompson, E. (2007). *Mind in life: Biology, phenomenology, and the sciences of mind*. Cambridge: The Belknap Press of Harvard University Press.

Varela, F. J. (1979). *Principles of biological autonomy*. New York: Elsevier North Holland.

Varela, F. J. (1997). Patterns of life: Intertwining identity and cognition. *Brain and Cognition, 34*(1), 72–87. doi:10.1006/brcg.1997.0907

Varela, F. J., Thompson, E., and Rosch, E. (1991). *The embodied mind: Cognitive science and human experience*. Cambridge, Massachusetts: The MIT Press.

Weber, A., and Varela, F. J. (2002). Life after Kant: Natural purposes and the autopoietic foundations of biological individuality. *Phenomenology and the Cognitive Sciences, 1*, 97–125.

Wegner, D. M. (2002). *The illusion of conscious will*. Cambridge: The MIT Press.

White, P. D., Rickards, H., and Zeman, A. Z. J. (2012). Time to end the distinction between mental and neurological illnesses. *British Medical Journal, 344*, e3454. doi:10.1136/bmj.e3454

Zautra, N. (2015). Embodiment, interaction, and experience: Toward a comprehensive model in addiction science. *Philosophy of Science, 82*(5), 1023–1034. doi:10.1086/683437