

Article

Technicity and the Virtual

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Abstract: This article outlines an eco-operational theory of technical mediation that centers on Gilbert Simondon's notion of *technicity*. The argument is that technical apparatuses *do the work of concepts*. However, the eco-operational viewpoint completely alters the status of concepts: what they are, where they are, and what they do. Technicity, as understood here, concerns the efficacious action and operational functioning of a broad range of apparatuses (including living bodies and technical machines), which are conceived as *adaptive mediators*. The focus on technicity provides a new notion of the virtual, that of the operationally real, which resonates with Gilles Deleuze's while also marking a new direction. What is more, by approaching mediation in terms of technicity, the eco-operational framework offers a novel understanding of concept or generality that stakes out a middle path between Kantian representational generality and Deleuzian concrete singularity.

Keywords: technicity; individuation; technical mediation; organism/machine; operational apparatuses; imagination/invention; virtuality; Simondon; Deleuze; Kant

1. Introduction

This article outlines an eco-operational theory of technical mediation. Challenging received dichotomies between the senses and the intellect, the natural and the artificial, it develops a theoretical framework that centers on the notion of *technicity*. The argument is that living bodies and technical machines *do the work of concepts*. This implies, among other things, that bodies and machines, by acting on their environments, are engaged in normative activity. By approaching this normative activity as *concept work*, the proposed framework alters the status of concepts: what they are, where they are, and what they do.

Technicity, as understood here, concerns the efficacious action and operational functioning of a broad range of apparatuses, including bodies and machines. This broad take on technicity has everything to do with the theoretical outlook of the proposed framework, which is *ecological* in that it replaces the epistemological subject-object model with an organism-environment model; and which is *operational* in that it focuses on the actions and behaviors of apparatuses broadly construed. By approaching living organisms and technical objects as *beings that operate*, it offers a new way of understanding bodies, machines, and their multifarious entanglements. Moreover, by foregrounding the technicity of thought *and being*, it offers a framework that puts technical mediation at the center of epistemology, and that sees technical mediation as integral to being due to the way apparatuses facilitate, provoke, or drive processes of individuation.

The suggestion that technical apparatuses do concept work of sorts, implies that they take on the role of quasi-Kantian conditions of knowledge. I use the modifier *quasi* because, as we shall see, the new role assigned to technicity serves to dismantle the Kantian conceptual framework. The treatment of bodies and machines as conditions of knowledge engenders a novel understanding of concept or generality that is not foreign to the senses—as it continues to be in Kant, for whom the general structure of the sensible world is supplied by the human subject. Kant's theoretical edifice is premised on an assumption of there being two entirely heterogeneous sources of cognition: sensibility and understanding.



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By challenging this assumption, the eco-operational approach seeks to remedy one of the most serious shortcomings of the Kantian framework: its cognitive dualism.

However, even though the Kantian framework is premised on a dichotomy between the senses and the intellect, there are hints in his work toward a more integral approach. For example, in the introduction to *Critique of Pure Reason*, he entertains the possibility that the “two stems of human cognition” originate from a “common but to us unknown root” (Kant 1998, p. 152). Thinkers seeking to overcome cognitive dualisms have often settled for (productive) imagination as the most promising candidate for this common root (e.g., Heidegger 1997). Kant himself, however, left the idea of a common root unexplored. The hints toward an integral approach are even more pronounced in the chapter on schematism in the same work. The undecided cross-over status of the transcendental schema, which Kant famously defines as both sensible and intellectual, has continued to spur other thinkers to break new conceptual ground—including Gilbert Simondon, the philosopher of technicity *par excellence*, who expounds the mode of existence of technical objects in terms of technical schemas and technical schematism (Simondon 2017, pp. 44, 251).

The most important contribution of the eco-operational approach is that it advances technicity as a new notion of concept or generality that is no longer defined in opposition to sensibility. Technicity concerns the efficacious action and operational functioning of apparatuses. Thus conceived, it belongs on neither side of the subject-object divide. It belongs, rather, to what Simondon refers to as the “dark central zone” that is left unexplored by Kant (Simondon 1992, p. 309). Technicity, in other words, shifts the epistemological focus to the middle: to the *mediating action of apparatuses*, which are now regarded as mediators in a new eco-operational sense; and to the *milieu*, which is where the efficacious action happens and where the process of knowledge takes place. This all suggests that technicity is a promising candidate for the common root hinted to by Kant. It should come as no surprise, therefore, that technicity, for Simondon, is closely connected with imagination, and that images, for him, are always already schemas.

In the eco-operational view, images are not to be identified with human consciousness or intention, nor are they to be conflated with the unreal. The emphasis put on the reality of images may prompt readers to think of various philosophical accounts of the *virtual*, such as the one(s) developed by Gilles Deleuze. Deleuze encapsulates what he understands by the virtual by a phrase borrowed from Marcel Proust: “Real without being actual, ideal without being abstract” (Deleuze 1994, p. 208). Similar notions of the virtual has been developed by Charles S. Peirce and Henri Bergson, both of whom influenced Deleuze’s account. Another important idea source for the Deleuzian virtual is Simondon’s theory of individuation. However, while the eco-operational approach advocated here is also informed by Simondon’s theory of individuation, the emphasis on technicity takes the virtual in a different direction. As this article seeks to show, technicity carves out a new domain of reality—an intermediate structured world that Simondon characterizes as a “stable mixture of the human and the natural” (Simondon 2017, p. 251). Pushing Simondon’s ideas about technicity and imagination one step further, I refer to this intermediate world as the *operationally real*.

The aim of this article is to sketch out a theory of technical mediation that acknowledges the epistemological and ontological import of technicity. Due to the way it approaches a broad range of beings as *operational apparatuses* in a new expanded sense, the proposed framework resonates with the machine ontologies put forward by Deleuze and some of his followers—while also diverging from these in subtle but significant respects. For one, the proposed approach is not a philosophy of immanence à la Deleuze, who characterizes his own position as “transcendental empiricism” (Deleuze 1994, p. 56). Nor does it advance a flat ontology à la Manuel DeLanda (DeLanda 2016), nor an object-oriented ontology à la Levi R. Bryant (Bryant 2011). Instead, it seeks to unlock new epistemologies and ontologies by moving beyond the vocabularies of immanence/transcendence and subject/object. The key to this unlocking is the replacement of the subject-object model by

an organism-environment model, which clears the way for a framework that reconceives bodies and machines as *adaptive mediators*.

The eco-operational approach also resonates with contemporary approaches that emphasize the agency of matter. Of special relevance is Karen Barad's theory of the agential roles of apparatuses, including her characterization of apparatuses as "*boundary-drawing practices—specific material (re)configurings of the world—which come to matter*" (Barad 2007, p. 140, original emphasis). This formulation comes close to what I mean by technical apparatuses doing concept work. Still, there are subtle differences, which again turn on the eco-operational take on apparatuses to be elaborated here. While confirming the Baradian idea of intra-active becoming, the proposed approach focuses on the idea of *operational couplings* between bodies or machines and their environments, along with the idea of bodies or machines having the power to induce a *change of level* in the organism-environment systems they form part of. Both these ideas, which I extrapolate from the philosophy of Simondon, serve to redeem the notion of mediation—a notion that is dismissed by Barad on the allegations that it is bound up with representationalism, does not take the empirical world seriously, holds nature at bay, and treats matter as a fixed substance with inherent properties (Barad 2007, pp. 152, 375, 445n). This article proposes a different approach: Instead of dismissing mediation on the terms set by representationalism, it seeks to rethink mediation along eco-operational lines. To accomplish this, I take my cue from Simondon, who sees mediation (in the new eco-operational sense to be explicated) as the "true principle of individuation" (Simondon 1992, p. 304).

The remainder of this article consists of four parts. I start out by examining Deleuze's account of the virtual, including his use of Simondon's notion of the preindividual (Section 2). I then turn to the eco-operational approach in a more sustained way by elaborating on Simondon's accounts of technicity and technical mediation (Section 3). I move on to propose an eco-operational notion of the virtual, that of the operationally real (Section 4). I conclude the article by recapitulating how the eco-operational approach alters the status of concepts (Section 5).

2. The Preindividual and the Virtual in Deleuze

The eco-operational theoretical framework, which centers on technicity, gives rise to a new notion of the virtual that differs in subtle but significant respects from established notions—including Deleuze's.

According to Charles S. Peirce, the proper meaning of the virtual can be traced back to the metaphysician John Duns Scotus. Peirce summarizes the Scotist notion of the virtual as follows: "A virtual X (where X is a common noun) is something, not an X, which has the efficiency (*virtus*) of an X" (Peirce 1902, p. 762). Peirce proceeds to warn about mistaking the virtual for the potential, which, as he points out, is almost its contrary, since "the potential X is of the nature of X, but is without actual efficiency" (Peirce 1902, p. 762). For the purposes of this article, the most interesting aspect of Peirce's definition is its focus on actual efficiency (or as I prefer it, *actual efficacy*), which takes the virtual in an operational direction.¹ However, the aspect that resonates the most with the Deleuzian virtual, is the point that is made in the second quotation, which emphasizes the importance of not confounding the virtual with the potential or possible.

The danger of mistaking the virtual for the possible is also emphasized by Henri Bergson. As Bergson points out, most philosophies are hampered by the misconception that "the possible is *less* than the real, and that, for this reason, the possibility of things precedes their existence" (Bergson 1946, p. 117, original emphasis). This misconception, Bergson maintains, is due to philosophy's failure to acknowledge that novelty happens at each moment of evolution. Doctrines are needed that admit the continuous creation of unforeseeable novelty, to leave room for indetermination and freedom in the world. Only then, when "the possible [is put] back into its proper place, evolution becomes something quite different from the realisation of a program" (Bergson 1946, p. 123). In this way, Bergson critiques the notion of the possible in favor of the virtual, which is already real (not

awaiting realization). In *Bergsonism*, Deleuze takes up Bergson's critique of the possible (Deleuze 1988, pp. 17–21), which is of central importance to Deleuze's endeavor to delineate the *genetic* conditions of *real* experience as opposed to Kant's *abstract* and *general* conditions of *possible* experience.

Thus, while Peirce conceives the virtual as *actual* in an operational sense (*virtus* as actual efficacy), Bergson and Deleuze conceive the virtual as *opposed* to the actual, while at the same time forming a circuit with it.

2.1. Deleuze's Take on the Simondonian Theory of Individuation

Deleuze's notion of the virtual is intimately linked to his critique of the tendency in mainstream Western philosophy to privilege identity over difference. In *Difference and Repetition* (Deleuze 1994), he seeks to reverse this situation, opting for a "Copernican revolution which opens up the possibility of difference having its own concept, rather than being maintained under the domination of a concept in general already understood as identical" (Deleuze 1994, pp. 40–41). This is also where Simondon comes in. Deleuze's rejection of the metaphysics of identity resonates deeply with Simondon's critique of established theories of the living being considered as an individual. This critique is formulated in Simondon's 1958 doctoral dissertation (Simondon 2013), which is also where he develops his theory of individuation.

As pointed out by Simondon, since antiquity philosophy has been dominated by two competing frameworks for understanding the individual: the *substantialist viewpoint*, which holds that the individual is a self-supporting and irreducible basic reality; and the *hylomorphic viewpoint*, which holds that the individual is made up of two intrinsic principles, namely matter and form. However, as Simondon makes clear, both approaches fail to give an adequate account of the process of ontogenesis—and they fail for the same reason: By giving ontological privilege to the already constituted individual, they bypass the point where individuation itself takes place as a process. Starting from the successfully individuated being, the received ways of thinking explain the existence of the individuated being by postulating a preexisting principle of individuation, which "prefigures the sort of constituted individual at which we will arrive, and the properties it will have once the process of constitution is complete" (Simondon 1992, p. 298). In doing so, substantialist and hylomorphic approaches make the common mistake of assuming a much too narrow understanding of ontogenesis. To put things right, Simondon sets out to "grasp the entire unfolding of ontogenesis in all its variety" (Simondon 1992, p. 300). This implies that we need to "*understand the individual from the perspective of the process of individuation,*" and not the other way around (Simondon 1992, p. 300, original emphasis). To assume a more extensive idea of genesis means that the individual is no longer seen as a separate existence. The individual, as understood by Simondon, is but a *relative reality*, in two senses: It is but a part of a larger system of being and occupies but a phase in the development of this larger system.

To further explicate the relative existence of the individual, Simondon introduces the notion of the *preindividual*. The idea that the individual exists merely as a phase in the being's development, "carries the implication of a preceding preindividual state," and further, that the individual "even after individuation, does not exist in isolation, since individuation does not exhaust in the single act of its appearance all the potentials embedded in the preindividual state" (Simondon 1992, p. 300). In *Difference and Repetition*, Deleuze seizes on Simondon's idea of a prior preindividual state. In the context of this article, is noteworthy to mention that, when the Simondonian preindividual is adapted into the Deleuzian context, it is articulated in a certain direction, being recast as "a virtual-ideal field, made up of differential relations" (Deleuze 1994, p. 246). In the same vein, individuation is now specified as a process where the individual "finds itself attached to a pre-individual half which is not the impersonal within it so much as the reservoir of its singularities" (Deleuze 1994, p. 246). Both these quotes indicate that the Simondonian distinction between the preindividual and the individual has now been appropriated to the

Deleuzian distinction between the virtual and the actual. This implies that the process of individuation is understood by Deleuze as a *process of actualization*.

As mentioned, in developing his notion of the virtual, Deleuze draws on several philosophical sources, including Peirce, Bergson, and Simondon. Among these three, Bergson is by far the most influential figure. The groundwork for Deleuze's approach to the virtual is laid out in *Bergsonism* (Deleuze 1988), which, as the title suggests, is a study dedicated to Bergson's philosophy. This means that, when ideas of Peirce and Simondon are adopted by Deleuze, they are accommodated to a metaphysical framework that remains largely Bergsonian.² This is also the case with Deleuze's deployment of the Simondonian theory of individuation.

2.2. The Bergsonian Underpinnings of Deleuzian Virtuality

Bergson's critique of the possible is valuable for Deleuze because it involves a renunciation of *representational generality* (or *representation* for short), i.e., of philosophical approaches that seek to reconstruct the real with general ideas or representations. This includes a renunciation of Kant's doctrine of abstract and general concepts as conditions of the possibility of experience. As Deleuze points out, Bergson introduces the notion of virtuality at the very moment he challenges the notion of possibility. The two notions differ in that while the *possible* is opposed to the *real*, the *virtual* is opposed to the *actual*. This implies that while the possible (which lacks reality) is subject to a process of realization, the virtual (which is already fully real) is subject to a process of actualization (Deleuze 1988, pp. 96–97; see also Deleuze 1994, p. 208).

For Deleuze, the distinction between the possible and the virtual is of utmost importance, as it marks the difference between a metaphysics of identity (such as Kant's) and a metaphysics of difference (such as Deleuze's own position). For while the possible is realized according to a *rule of resemblance*, the virtual is actualized according to a *rule of difference*. According to Deleuze, in a framework like Kant's, which posits abstract and general concepts as conditions of possible experience, "the real is in the image and likeness of the possible that it realizes" (Deleuze 1988, p. 97). Hence, in the process of realization, *identity* is primary, since "from the point of view of the concept, there is no difference between the possible and the real" (Deleuze 1988, p. 97). In the process of actualization, on the other hand, *difference* is primary, since the actual does not at all resemble the virtual. Instead, it must "create its own lines of actualization in positive acts" (Deleuze 1988, p. 97, original emphasis).

The Bergsonian approach centers on duration, or life, which Deleuze further articulates as "a becoming that endures, a change that is substance itself," or else, as "the variable essence of things" (Deleuze 1988, pp. 34, 37). The notions of virtuality and duration are closely assimilated to the point that duration *is* the virtual at work. This becomes clear in Deleuze's explication of Bergson's *élan vital*: "It is always a case of a virtuality in the process of being actualized, a simplicity in the process of differentiating, a totality in the process of dividing up" (Deleuze 1988, p. 94). Duration is further specified as a *multiplicity*, more precisely as a *qualitative* multiplicity, which is continuous and heterogeneous. Duration is the virtual in the course of being actualized, constantly changing in kind in the very process of dividing up. This contrasts with the *quantitative* multiplicity of representation, which is discontinuous and homogeneous, and which, as Deleuze explains, differs only in degree (Deleuze 1988, pp. 38, 42). Thus, while duration cannot be reduced to numbers on the account that it continuously creates unforeseeable novelty, a quantitative multiplicity *can* be thus reduced, as it comprises entities that refer back to the same general idea, representation, or concept, which determines them as instances of the same thing.

This distinction between difference in kind and difference in degree is critical to the Deleuzian virtual, since it is what distinguishes the virtual from the actual, or in Bergson's terms, the pure from the impure or mixed. According to Bergson, experience offers us nothing but *composites*—impure mixtures of duration and extensity, such as when recollection is mixed with perception. For Bergson, the issue, however, is not so much that,

in actual reality, things are mixed. The point of concern, rather, is that we have “lost the ground of composites,” and hence, that we mistake differences in kind for differences in degree and no longer know how to “recognize what goes back to perception and what goes back to recollection” (Deleuze 1988, p. 22). This is where the Bergsonist method comes into play. This method, Deleuze explains, has two steps: the moment of dualism and the moment of monism (Deleuze 1988, p. 30).

The first step of the method (the moment of dualism) reflects the Bergsonist ambition to avoid false problems by restoring differences in kind. Experience, or representation, presents us with composites, whereas in reality (or so the Bergsonist argument goes) there are two directions or lines—one objective and one subjective—that are radically different: “that of perception which puts us *at once* into matter and that of memory which puts us *at once* into the mind” (Deleuze 1988, p. 26, original emphasis). A composite, therefore, must be divided according to its “natural articulations,” that is to say, “into the elements that condition it, into pure presences or tendencies that differ in kind” (Deleuze 1988, pp. 22, 24). However, these pure tendencies—which are the conditions of experience—lie beyond our own (human) experience. The Bergsonist method, therefore, takes us “above that decisive *turn*, where, taking a bias in the direction of our utility, [experience] becomes properly *human* experience” (Deleuze 1988, p. 27, original emphasis). Thus, it is only by following each line of experience beyond the threshold of human experience that we discover differences in kind.

Reflecting on the philosophical significance of the Bergsonist method, Deleuze makes two points of relevance to the concerns of this article: First, the following of the diverging lines of experience beyond the turn involves an extraordinary broadening of the notion of experience, forcing us to think a “pure perception identical to the whole of matter,” and a “pure memory identical to the totality of the past” (Deleuze 1988, p. 27). This suggests that the meaning of philosophy is to “go beyond the human condition,” and hence to open ourselves up to “the inhuman and the superhuman,” to durations below and above the properly human durations (Deleuze 1988, p. 28). Second, the Bergsonist strategy of going beyond and broadening out suggests that the true conditions of experience are not concepts à la Kant. While Kant is concerned with conditions of *possible* experience *in general*, Deleuze is concerned with conditions of *real* experience *in all its peculiarities*. The latter differ from the former in that they are “less determined in concepts than in pure percepts” (Deleuze 1988, p. 28). Nevertheless, concepts are needed—but of a new Bergsonist kind that are neither abstract nor general: For “while these percepts themselves are united in a concept, it is a concept modeled on the thing itself, which only suits that thing, and which, in this sense, is no broader than what it must account for” (Deleuze 1988, p. 28).

While the first step of the Bergsonist method leads us beyond the turn where the objective and subjective lines of experience diverge increasingly according to their differences in kind, the second step of the method leads us beyond a second turn where the two lines converge and intersect at a virtual point—not at the uncertain point in experience from which we started but “at a virtual image of the point of departure, which is itself located beyond the turn in experience; and which finally gives us the sufficient reason of the thing” (Deleuze 1988, p. 28). This is also the point at which “recollection inserts itself into perception” (Deleuze 1988, p. 30). A genuine point of unity is made possible thanks to Bergson’s discovery of “a deeper contraction-memory at the heart of recollection-memory.” The notion of *contraction* indicates that our perception contracts a multitude of rememorized elements, and hence, that our present infinitely contracts our past, implying that “*the present itself is only the most contracted level of the past*” (Deleuze 1988, p. 74, original emphasis). What this means is that the second step of the Bergsonist method marks a shift from a *dualism* focusing on differences in kind to a new *monism* focusing instead on levels of expansion and contraction.

The notion of contraction-memory is crucial to Deleuze’s project of uncovering the conditions of real experience, as it “recognizes intensities, degrees or vibrations in the qualities that we live as such outside ourselves and that, as such, belong to matter” (Deleuze

1988, p. 92). Contraction-memory provides Deleuze with another key notion, that of *intensity*, which is closely associated with the virtual-actual pair. The virtual and its associated terms (including intensity) play a central role in Deleuze's mature work—not the least in *Difference and Repetition*, where he proposes a metaphysics of difference in his own name.

2.3. *The Role of the Virtual in Deleuze's Empiricist Reversal of Kant*

By characterizing his own approach as *transcendental empiricism* (Deleuze 1994, pp. 56–57), Deleuze acknowledges a certain indebtedness to Kant. That said, the approach he develops in *Difference and Repetition* radically recasts the transcendental project as envisioned by Kant. While Deleuze celebrates Kant for having developed an immanent metaphysics of experience, he reproaches him for making the immanent or transcendental field dependent on a transcendental subject, and hence for making the entire sensible world conform to the conditions legislated by the human understanding. In the same vein, Deleuze criticizes Kant for assigning a paramount role to abstract and general concepts, which, in Deleuze's view, are “too large for the real” (Deleuze 1994, p. 68). Thus, while Deleuze's metaphysics remains immanent (i.e., related to experience), it differs from Kant's in its focus on *concrete* conditions involved in the *genesis* of *real* experience. It differs, also, in locating the conditions of real experience, not in the faculty of understanding, but in *sensibility*. Deleuze, in other words, sets out to correct Kant's failures by undertaking an empiricist reversal of the transcendental project.

According to Deleuze, if we are to come to grips with the conditions of the genesis of the real, we must rethink the notion of repetition. This means that we must distinguish real repetition from Kant's notion of generality, which is a “generality of the particular,” and establish instead a “universality of the singular” (Deleuze 1994, p. 1). This is because, as Deleuze sees it, repetition cannot be explained by conceptual identity or the sameness of representation, since this leaves us with nothing but an abstract repetition devoid of any interior—with a mere repetition of the same. Beneath abstract repetition, there is real repetition, a “play of singularities” through which something new is produced (Deleuze 1994, p. 25). Deleuze makes a similar argument for the notion of difference. Conceptual difference reduces difference to a mere difference-between, to a negative and extrinsic difference between objects referring to the same concept. If we are to get a grip on real repetition, a *positive* and *affirmative* principle of difference is needed—which for Deleuze means a *non-mediated* difference that is internal to experience, yet without being conceptual (Deleuze 1994, p. 25). The name Deleuze gives to this real repetition or internal genesis is *intensity*, which he further characterizes as “pure difference in itself” (Deleuze 1994, p. 144).

For Deleuze, as for Kant before him, the path that leads to thought begins with sensibility. Yet, for Deleuze, the point of departure is not an object recognized, but rather an encounter with something in the world that forces sensation (Deleuze 1994, p. 145). This something is *difference in intensity*, which is that by which the given is given. This means that, in Deleuze's account of sensibility, intensity is the transcendental condition of that which appears. However, from the point of view of empirical sensibility, the intensive individuating factors are imperceptible, due to the way they cancel themselves out as soon as they are actualized, rushing “headlong into suicide” (Deleuze 1994, p. 224). The intensities, in other words, are covered over, alienated, or contradicted by the actual extensities they give rise to. Thus, in Deleuze's view, what brings about individuation within the perceptual world is not a unified self but a prior intense field consisting of impersonal individuations and preindividual singularities (Deleuze 1994, p. 281). Picking up on Bergson's notion of contraction-memory, Deleuze replaces Kantian receptivity with “contractile contemplation,” thus introducing the idea of a “larval self” composed of “thousands of habits”—a domain of sub-representative passive syntheses that constitute the system of a dissolved self (Deleuze 1994, p. 78). This, then, is how Deleuze undertakes an empiricist reversal the transcendental project: by assigning a transcendental status to the intensities encountered in sensation. In this way, Deleuze expands the transcendental

field beyond human experience as narrowly defined by Kant, assuming instead a broader understanding of sensory experience that includes the “unconscious of little perceptions or intensive quantities” (Deleuze 1994, p. 244).

Intensity is related, not to abstract and general concepts, but to virtual *Ideas* understood as *concrete universals*. According to Deleuze, if we are to rediscover the conditions of real experience, we must follow the path of individuation in reverse: Starting from that which appears to us in spatio-temporal reality (the actual), we must return to the regions where “singularities are free to be deployed or distributed within pure Ideas, and individuating factors to be distributed in pure intensity” (Deleuze 1994, p. 282). This procedure entails that we follow the path of individuation “to the bend at which ‘reason’ plunges into the beyond” (Deleuze 1994, p. 282). Again, as in *Bergsonism*, Deleuze advocates a method that leads us beyond the threshold of properly human experience. The Deleuzian Ideas take inspiration from Kant’s *ideas of reason*, which is the name Kant assigns to the concepts and principles human reason comes up with when it transgresses its own limits. However, while Kant’s ideas of reason are *transcendent* (i.e., concerned with entities beyond sensory experience, such as God, the soul, and cosmological ideas), the Deleuzian Ideas are *immanent* (i.e., beyond human experience but still within sensory experience in the broader sense indicated). This all means that the unconscious of intensity echoes and refers to another unconscious, that of virtual Ideas. As Deleuze sees it, Ideas and intensity are two types of relation or figures of difference that are intimately connected in that “[t]he aesthetic of intensities [. . .] develops each of its moments in correspondence with the dialectic of Ideas,” which further implies that “the power of intensity [. . .] is grounded in the potentiality of the Idea” (Deleuze 1994, p. 244). Put more simply: Ideas and intensity are linked in that the individuating intensive processes are structured by Ideas.

Deleuze characterizes the unconscious of Ideas as an art of the dialectic, thus indicating that Ideas have to do with thought—just as intensities, on their side, have to do with sensation. Importantly, however, Ideas do not structure intensive processes by subsuming them under general laws of thought. The relation between Ideas and intensity is rather one of *actualization*—implying that processes of individuation consist in the actualization of Ideas. Deleuzian Ideas differ from Kantian concepts also in that they are immanent in the processes they structure. Ideas are virtual multiplicities that are neither one nor multiple but defined rather as complex themes or systems made up of reciprocally determined elements within larger networks of differential relations, along with singularities determined by these differential relations. An example would be “the Idea of color,” which, as Deleuze understands it, “is like white light which perplicates in itself the genetic elements and relations of all the colours, but is actualised in the diverse colours with their respective spaces” (Deleuze 1994, p. 206). By replacing abstract and general concepts with Ideas conceived as concrete universals, Deleuze seeks to accomplish a radical change in the theory of thought, aiming for a “thought without image” (Deleuze 1994, p. 276). This is also how he seeks to overcome the Kantian dualism between sensibility and understanding. Ideas or concrete universals differ from Kantian concepts in that they “include variety or multiplicity in themselves,” along with “singularity in all its varieties” (Deleuze 1994, p. 176). In doing so, they pave the way for “an empiricism of the Idea” (Deleuze 1994, p. 278). Thus, as Deleuze sees it, the positing of an immanent virtual-ideal field contributes to a radical change in the theory of thought due to the way it provides thought with a “differential unconscious”—with an intensive world of free-floating differences where the subject is not in charge (Deleuze 1994, p. 213). Deleuze also characterizes this world as a “chaotic world *without identity*,” and at times—borrowing a term from James Joyce—as a “*chaosmos*” (Deleuze 1994, p. 57, original emphasis).

As conceived by Deleuze, the virtual is very much an ontological notion, carving out a new existential domain that is immanent but nevertheless objective (in the Deleuzian sense of lying outside the dominion of the thinking subject). He adopts and adjusts the Simondonian preindividual to further specify this new domain. Deleuze is attracted to the notion of the preindividual because it emphasizes how “individuation presupposes a prior

metastable state" (Deleuze 1994, p. 246). The term *metastability* will be explained in the next section. The point to be made here is that the preindividual field, as both Simondon and Deleuze understand it, is characterized by *disparateness*—a situation where potentials are distributed between two or more orders of reality, yet where there is no communication between them. Thus conceived, the preindividual field is a problematic field where individuation emerges as an act of problem-solving, releasing—or as Deleuze prefers it, actualizing—potentials by establishing communication between disparate orders. Interestingly, however, while Deleuze applauds Simondon for emphasizing “the importance of disparate series and their internal resonance in the constitution of systems,” he expresses reservations about the latter’s account of *disparateness*, which, as Deleuze sees it, “maintains as a condition the requirement of resemblance between series, or the smallness of the differences in play” (Deleuze 1994, p. 318, note 25). With this remark, Deleuze appears to suggest that Simondon is not radical enough in his rejection of representational generality, and more specifically, that he fails to understand the preindividual field as a domain of pure difference in itself—implying that Simondon (at this point at least) has fallen back into old ways of thinking. However, if we consult the pages in Simondon’s work that Deleuze refers to while expressing his reservations (Simondon 1964, pp. 254–57), a more complex picture emerges. For in these pages, which deal with the exchange of signals between technical objects, Simondon articulates *disparateness* in a way that conforms *neither* to Kantian identity *nor* to Deleuzian difference.³ In the next two sections I seek to show that Simondon’s distinctive take on *disparateness* is not a slippage into representationalism but rather indicative of his overall eco-operational approach, which allows us to understand individuation and mediation differently.

3. Technicity and Technical Mediation

In this section I elaborate on what it would mean for technical apparatuses (e.g., living bodies or technical machines) to do the work of concepts. This includes developing an eco-operational framework that emphasizes the technicity of thought *and* being. In the proposed approach, bodies and machines are treated as conditions of sorts, more precisely as adaptive mediators.

Simondon’s notion of technicity was developed in his 1958 supplementary dissertation, which has been translated into English as *On the Mode of Existence of Technical Objects* (Simondon 2017). As the title suggests, *Mode of Existence* deals with technology, approaching technical objects as *individuals* along the lines of his main dissertation (Simondon 2013). In this work, technical individuals—or machines, as Simondon also calls them—are treated as beings that go through an ontogenetic development much in the same way as living beings. The originality of Simondon’s philosophy of technology lies precisely in this: It approaches machines as *quasi-organisms*.

3.1. Mediation as the Principle of Individuation

Having pointed out the shortcomings of substantialist and hylomorphic understandings of the individual, Simondon proceeds to suggest “a complete change in the general approach to the principle governing individuation” (Simondon 1992, p. 300). Instead of the established vocabularies of substance, matter, and form, he theorizes being in terms of *systems* and *phases*. A system of being is further defined as *metastable*, which means that it “contains latent potentials and harbors a certain incompatibility with itself, an incompatibility due at once to forces in tension as well as to the impossibility of interaction between terms of extremely disparate dimensions” (Simondon 1992, pp. 300, 302). Individuation, in turn, is defined as “a partial and relative resolution” manifested in such a system (Simondon 1992, p. 300).

Simondon’s focus on heterogeneous and metastable systems of being has thoroughgoing implications, not the least when it comes to understanding the status and role of mediation. With the onset of individuation, being adopts a certain structure and becoming—a certain “mode of resolving an initial incompatibility that was rife with potentials” (Si-

mondon 1992, p. 301). This is precisely what *mediation* means for Simondon: the action of resolving an initial incompatibility between higher and lower orders of magnitude through a redistribution of elements and powers into “structured individuals of a middle order of magnitude” (Simondon 1992, p. 304). The mediating action of resolving the initial incompatibility initiates a new phase in the system, which is why Simondon refers to mediation as the “true principle of individuation” (Simondon 1992, p. 304). Moreover, the mediating action of putting disparate parts of the system into communication releases new potentials for further developments, which is why Simondon characterizes individuation as a “mediate process of amplification” (Simondon 1992, p. 304). Both these points imply that the system of being remains heterogeneous and metastable even *after* individuation has taken place—which for Simondon is a good thing because the remaining preindividual tensions are what keep the system alive and enable it to undergo further changes. To pick up on the previous discussion (in Section 2.1) of the relative existence of the individual, the Simondonian individual can now be further defined as a mediating or resolving structure that institutes and sustains a certain *phase* of a larger metastable system of being.

Simondon’s notion of metastability takes inspiration from the phenomenon of *metastable equilibrium* as studied in modern physics (thermodynamics and quantum mechanics). Simondon’s adoption of this concept frames individuation as a process that proceeds “by quantum leaps through a series of successive equilibria” (Simondon 1992, p. 301). This implies two things: first, that being undergoes a stepwise evolution that occurs through a series of inventive phase shifts; and second, that being has the capacity to fall out of phase with itself, only to resolve itself by entering a new phase in its development. This suggests that individuation has an energetic aspect that is missing in substantialist and hylomorphic accounts of the individual. As Simondon points out, the ancients were unable to define being in its metastable state because they lacked the physical paradigm that would allow them to conceive of such a state. Recognizing only movement and rest, the ancients presumed being to be “in a state of stable equilibrium at all times”—thus excluding the idea of becoming (Simondon 1992, p. 301). A metastable system of being, by contrast, is characterized by its capacity to undergo transformation, to “break its own bounds in relation to its *center*” (Simondon 1992, p. 311, original emphasis). This is also why the concepts and principles of classical logic (such as the principles of identity and the excluded middle) fail us: They do not apply to being in its metastable state. The reason for this is that a metastable system of being always contains *more* than that which is identical to itself. As Simondon puts it, a metastable system is “more than a unity and more than identity” (Simondon 1992, p. 312). Concepts, as traditionally understood, are valid only for the *results* of individuation—and even then, they refer only to a diminished being, to the individual taken in isolation, failing to factor in the corresponding milieu.

The Simondonian criticism of classical logic and concepts also extends to Kant, whose distinction between the a priori and the a posteriori reinserts the hylomorphic schema, which, as Simondon notes, “obscures, with its dark central zone, the true process of individuation that is the seat of knowledge” (Simondon 1992, p. 309). To rectify this, Simondon returns to the middle, probing into the dark central zone in which individuation occurs as a process. Moreover, to get a better grip on the true process of individuation, he introduces the term *transduction*, which is at once a logical and metaphysical notion. As defined by Simondon, transduction applies to any situation where an individuation occurs—to any situation where there is “activity, both structural and functional, which begins at the center of the being and extends itself in various directions from this center, as if multiple dimensions of the being were expanding around this central point” (Simondon 1992, p. 313). The transductive process, which may be physical, biological, mental, or social, is further defined as an activity whose “dynamism derives from the primitive tension of the heterogeneous being’s system, which moves out of step with itself and develops further dimensions upon which it bases its structure” (Simondon 1992, p. 313). Accordingly, when it comes to knowledge, transduction “maps out the actual course that invention follows, which is neither inductive nor deductive but rather transductive” (Simondon 1992, p. 313).

Individuation, therefore, is not about synthesis or a return to unity (as in Kant). The notion of transduction suggests, rather, that the process of knowledge involves *invention*, as does the process of becoming.

To illustrate the transductive process, Simondon uses the example of a crystal that grows and extends itself in its supersaturated mother-water, where already formed layers of molecules serve as structuring bases for new layers of molecules. His point is that, even in the simple case of crystallization, the vocabulary of form and matter fail to account for the process. To better understand the process of crystallization, we need to talk about *information* in a new transductive sense, which presupposes the existence of a metastable system in a state of supersaturation, and which approaches individuation as an amplifying communication that resolves the initial incompatibility. Thus, contrary to the notion of form, information (as understood here) is not a unique term, but rather a “meaning that arises on the heels of a disparation” (Simondon 1992, p. 316). In its focus on disparation, the transductive approach to information differs markedly from the approaches developed in modern information theory—most notably in Claude Shannon’s mathematical theory of communication (Shannon and Weaver 1949)—where, as Simondon indicates, the notion of information is “*derived by abstraction [...] from transmission technology*” (Simondon 1992, p. 316, original emphasis).

While discussing physical individuation, exemplified by the formation of a crystal, Simondon sometimes talks as if there were an initial primitive state of being without steps or division into stages, without becoming that “affords the being mediation” (Simondon 1992, p. 307). Simondon refers to this initial state as “the preindividual being” (Simondon 1992, p. 301). In the same vein, he argues that the transductive process “derives the resolving structure from the tensions themselves within the domain [...], and not through the help of some foreign body” (Simondon 1992, p. 314). It is, above all, formulations such as these that warrant Deleuze’s adoption of the preindividual to his own metaphysics of difference, including to the Deleuzian notions of the virtual and non-mediated difference. However, as soon as we shift our focus from *physical* individuation to *biological* individuation, the identification between the Simondonian preindividual-individual pair and the Deleuzian virtual-actual pair becomes more strained.

While crystallization furnishes us with a simple and illustrative example of the transductive process, it falls short of accounting for the individuation of a *living* being considered as an individual. This is because the living individual “is not only the result of individuation, like the crystal or the molecule, but is a veritable theater of individuation” (Simondon 1992, p. 305). As conceived by Simondon, the living being is characterized by “a perpetual individuation that is life itself” (Simondon 1992, p. 305). The example of the crystal falls short also because the living individual “is not, like that of the physical individual, concentrated at its boundary with the outside world” (Simondon 1992, p. 305). The living individual possesses a “genuine interiority,” which means that there exists within it “a more complete regime of *internal resonance* requiring permanent communication and maintaining a metastability that is the precondition of life” (Simondon 1992, p. 305, original emphasis). This means that, in contrast to the physical individual, the living individual resolves its problems “by modifying itself through the invention of new internal structures” (Simondon 1992, p. 305). This, then, is why Simondon characterizes the living individual as an “agent” of individuation—as a system of individuation that to a certain extent “*individuates itself*” (Simondon 1992, pp. 305, 307, original emphasis).

My point here is that, depending on whether we take physical individuation or biological individuation as our paradigm case, we end up with a somewhat different understanding of the process of individuation. This is because, in the domain of the living, there is no preindividual being in the pure sense Simondon sometimes indicates when discussing physical individuation—no initial primitive state of being that is “without the refinements of mediation” (Simondon 1992, p. 302). In the development of the living being, such as a living organism, there is always already a mediating or resolving structure at work. This means that, in the domain of the living, individuation is not strictly speaking a

process of actualization in the Deleuzian sense (i.e., a process that moves *from* the virtual *to* the actual). The development of the living organism seems to move, rather, through an open-ended series of metastable stages that are always already actual. However, we are dealing here with an understanding of the actual that differs from the Bergsonian definition in terms of an “arrest of movement” by which “the living being turns on itself and *closes itself*” (Deleuze 1988, p. 104, original emphasis). For in Simondon’s view, the living individual is a mediating or resolving structure that *remains open*—and hence *more than a unity*—even after individuation has taken place.

Simondon’s characterization of the living individual as the result, theater, and agent of individuation implies that the living being, in some sense or other, does the work of concepts. As already hinted, we are dealing here with concept work in a sense that emphasizes *action* rather than *representation*, more precisely the normative activity of bodies and machines as they negotiate their terms with their environments. As Simondon sees it, living individuals and technical individuals are both characterized by the way they actively create—and not merely adapt to—their environments (see Section 3.4 for further details). This implies in turn that we have to do with a new understanding of the term *concept* that goes beyond the options we have discussed so far: the Kantian abstract and general concept and the Deleuzian concrete universal. As a mediating or resolving structure, the living individual is *neither* general *nor* singular in the established senses of these terms. Instead, we are dealing with a concept that grows from the middle, from the dark central zone—a concept, therefore, that “is neither a priori nor a posteriori but a praesenti, because it is an informative and interactive communication between that which is larger than the individual and that which is smaller” (Simondon 1992, p. 310).

By introducing *a praesenti concepts*, Simondon embarks on an eco-operational conceptual path that is further developed in his work on technology. It is no coincidence, therefore, that when Simondon sets out to explore the mode of existence of technical objects, it is his account of *biological* individuation (and not that of physical individuation) that is brought to bear on the technical individual or machine.

3.2. The Eco-Operational Underpinnings of Simondonian Technicity

As is well-documented in the literature, Simondon’s philosophy was deeply influenced by cybernetics, from which he adopted much of his vocabulary, including the notion of information.⁴ Both approaches undo long-standing dualisms of living beings and technical objects by emphasizing their adaptability and responsiveness to changes in the world around them. For all that, Simondon remains critical in his reception of cybernetics, warning against the tendency of some cyberneticists (e.g., Norbert Wiener) to assume an “improper identification of the technical object with the natural object” (Simondon 2017, p. 50). Instead of conflating living bodies and technical machines, Simondon suggests that we approach the latter as quasi-organisms.

Simondon’s preoccupation with the living being is indicative of another major influence on his work that has been less commented upon in the literature, namely that of a certain strand of *ecological* theory. This line of theory was initiated by the biologist Jakob von Uexküll (Uexküll 1926), who coined the term *Umwelt*—suggesting that different kinds of organisms inhabit different *Umwelten* or surrounding worlds even when they share the same physical environment. The notion of *Umwelt* was adopted and critically adjusted by the neurologist and psychiatrist Kurt Goldstein (Goldstein 1995), who in turn influenced thinkers such as Georges Canguilhem and Maurice Merleau-Ponty—both of whom were Simondon’s teachers.

While the ecological approaches mentioned are all influenced by Kant, they diverge from the Kantian path in that they replace the subject-object model with a reciprocal organism-environment model. That said, the organism-environment model has evolved and transformed considerably since Uexküll’s original formulation. While Uexküll envisions the living organism as always perfectly adjusted to its habitat, subsequent thinkers such as Goldstein assumes a less harmonious model, characterizing the relationship be-

tween the organism and its environment as an ongoing confrontation. Thus, while Uexküll understands the life-path of an organism as a fixed life-tunnel (Uexküll 1926, pp. 84, 322), Goldstein leaves the organism a certain leeway, allowing it to negotiate its terms and conditions of existence.

Canguilhem, like Goldstein before him, emphasizes the negotiation between the organism and its environment to help explain health and disease. In Canguilhem's view, the healthy organism is characterized by a "superabundance of means," which endows it with a certain "normative capacity"—a capacity to "establish other norms in other conditions" (Canguilhem 1991, pp. 183, 200). Instead of simply complying with the demands of the environment, the healthy individual is "set on gaining constants anew," being capable of "following new norms of life" (Canguilhem 1991, pp. 194, 200). Thus understood, the healthy state of the organism is one that "allows transition to new norms" (Canguilhem 1991, p. 228). The pathological state, by contrast, is characterized by a loss of normative capacity, the sick organism being less open to eventual change. To be cured, then, "is to be given new norms of life" (Canguilhem 1991, p. 228). Canguilhem's discussion of the living being in health and disease resonates deeply with Simondon's account of biological individuation, according to which the living individual evolves by constantly falling out of phase with itself only to resolve itself anew—and in this way entering new stages in its development.

Canguilhem's treatment of the ecological motif takes steps toward what I call an *eco-operational* approach: The *Umwelt* is defined by Canguilhem in operational terms as the "milieu of behavior proper to a certain organism" (Canguilhem 2008, p. 111). However, the organism's surrounding world of possible actions is not a static given. For what does it mean to say that the living organism is engaged in normative activity? It means that life "establishes norms," that it "posits values not only in the environment but also in the organism itself" (Canguilhem 1991, pp. 127, 227). Thus understood, life cannot possibly be "the blind and stupid mechanical force that one likes to imagine when one contrasts it to thought" (Canguilhem 2008, p. xviii). By acknowledging the organism's normativity (including its action on the environment), Canguilhem rejects the idea of a fundamental conflict between life and thought. Instead, he defines knowledge in integral *and* operational terms as the "general method for the direct or indirect resolution of tensions between [hu]man and milieu" (Canguilhem 2008, p. xviii). Canguilhem's integral and operational notion of knowledge resonates with Simondon's account of individuation as a transductive process (i.e., as a mode of resolving tensions in a metastable system of being), and of the individual as a mediating or resolving structure. However, what truly marks the theory developed in this article as an *eco-operational* approach (as opposed to a merely ecological approach), is the extra ingredient of *technicity*. This notion entails a specific understanding of operativity, which includes the establishment of a materializing or idealizing recurrence—a metastable behavioral norm of sorts—through which the organism-environment system gains a certain readiness for action (as explained in further detail in Section 3.4).⁵

Merleau-Ponty also make important contributions to an *eco-operational* approach. Like Canguilhem he draws inspiration from Goldstein, and the references to the latter are particularly plentiful in one of the central chapters of *Phenomenology of Perception* (Merleau-Ponty 2012), where he discusses the relation between the spatiality of one's own body and motricity. This is the chapter where Merleau-Ponty introduces the notion of *body schema*, which explicates the peculiar unity of the lived body (i.e., the body considered in its lived relationship to the world). As Merleau-Ponty explains, the body schema is neither a "result of associations established in the course of experience," nor a "form, or phenomenon in which the whole is anterior to the parts" (Merleau-Ponty 2012, p. 102). In fact, the body schema, as Merleau-Ponty understands it, is not a mental representation at all. It is defined, rather, as the lived integration of body parts that situates the organism in a certain configuration of possible actions. The body schema, therefore, appears to the living being "as a posture toward a certain task, actual or possible" (Merleau-Ponty 2012, p. 102). Moreover, the body schema is defined as a habitual system that is "open

onto the world, and correlative with it" (Merleau-Ponty 2012, p. 526, footnote 115)—and hence transformable. He proceeds to specify the body schema as the "always implied third term of the figure-background structure" (Merleau-Ponty 2012, p. 103). Merleau-Ponty's theory of the body schema resonates profoundly with Simondon's account of the technical individual or machine, which Simondon specifies precisely as a *technical schema*, more precisely as a *schema of operation*—a system of behavior that is open onto, and correlative with, the surrounding environment, which is referred to by Simondon as its *associated milieu* (Simondon 2017, pp. 45, 59).

In *Phenomenology of Perception*, Merleau-Ponty breaks with Kant by replacing the thinking subject ("I think that") with an anonymous and pre-personal motor subject ("I can") (Merleau-Ponty 2012, p. 139). Merleau-Ponty's idea of motricity as an original motor intentionality is symptomatic of his integral approach, which no longer adheres to the Kantian distinction between the sensible and the intelligible world. The notion of body schema indicates, rather, the existence of a more fundamental logos—of a concept or generality that is "not the generality of an idea, but rather that of a style of behavior" (Merleau-Ponty 2012, p. 425). In his later work, Merleau-Ponty pushes even further in the eco-operational direction by conceiving the lived body as a site of exchange with the world, while at the same time serving as the standard or measure of things: "my body is not only one perceived among others, it is the mesurant (*mesurant*) of all, *Nullpunkt* of all the dimensions of the world" (Merleau-Ponty 1968, pp. 248–49). Rephrased in Canguilhemian terms, Merleau-Ponty's characterization of the lived body as a standard or measure indicates that the lived body has a normative capacity, enacting a certain resolution of its environment, and in doing so, configuring the latter as a specific milieu of behavior. As we shall see, this is very much how Simondon understands the mediating role of bodies and machines—the notion of technicity covering the resolving and normative action of both.

3.3. Technical Individuation and Technical Mediation

In their efforts to vindicate the rationality of life and sensibility, Canguilhem and Merleau-Ponty both criticize the Cartesian theory of the animal-machine. Each in their own way, they make the point that the living organism cannot be reduced to a machine.⁶ Simondon takes the next decisive step by advancing the view that *not even a machine can be reduced to a machine* (in the established mechanical sense of the term). This step is important, as it clears the way for a broad understanding of technicity that factors in the resolving and normative action of both living bodies and technical machines.

Simondon's philosophy of technology treats the technical object as a quasi-organism. The technical object is a quasi-organism, first, in that it undergoes an ontogenetic development; and second, in that it exists in conjunction with a specific environment—its *Umwelt*, so to speak. Furthermore, the technical object is best defined as a *being that operates*.⁷ This means that it operates "neither according to causality, which is too fragmentary, nor according to finality, which is too unitary, but according to the dynamism of lived functioning" (Simondon 2017, p. 151). In Simondon's view, the living organism is the paradigmatic example of what he calls *concrete being*: It is a metastable entity that is highly integrated, and that forms a joint system with its surrounding environment (Simondon 2017, p. 51). For all that, in its newly invented state, the technical object is still *abstract*: It consists of fragmented parts; and, as it is not yet connected to an environment, it lacks real efficacy. It is only when it starts to develop that the technical object comes closer to the mode of existence of the living being: first, in that its elements become more integrated (approximating the integration of organs in the living body); and second, in that it becomes coupled to its surroundings (approximating the vital reciprocal linkages between the living being and its environment). This explains why Simondon conceives technical individuation as a process of *concretization*—a process through which the technical object becomes *naturalized* in the sense of becoming integrated into "the world of natural causes and effects" (Simondon 2017, p. 251). For all that, Simondon never goes so far as to conflate technical and natural (in this case: living) objects. While technical beings "tend toward concretization," they

will always differ from living beings, which are “concrete to begin with” (Simondon 2017, p. 51). Still, the point is that the *evolved* technical object is *more real* than the primitive or undeveloped technical object in the sense that it is more connected and more efficacious.

In his thesis on the mode of existence of technical objects, Simondon considers technical objects on three levels: *elements*, *individuals*, and *ensembles*. He devotes most attention to the mid-level, that of technical individuals or machines, because this is the level at which the technical object can be properly described as a being that operates. He focuses on the level of technical individuals also because this is where the technical object pairs up with a specific environment: its associated milieu. In Simondon’s view, the technical individual or machine exists as an individual-environment system—which is to say that the technical individual cannot be properly defined without also taking the associated milieu into consideration.

The Simondonian machine, then, is not a separate being, closed upon itself. It progresses toward individuality only by *mixing* with non-technical elements and powers. Nor is the machine a singular being. The gasoline engine, for example “is not this or that engine given in time and space, but the fact that there is a succession, a continuity that runs through the first engines to those we currently know and which are still evolving” (Simondon 2017, p. 26). The technical object, in other words, progresses toward individuality only by *multiplying* itself—by engendering a “family” of related technical objects (Simondon 2017, p. 46). The oneness of the technical object, therefore, is a certain “unit of coming-into-being” that evolves through convergence and self-adaptation across an evolutionary lineage (Simondon 2017, p. 26). The idea is that, in the course of its development, the technical individual “unifies itself internally according to a principle of inner resonance” (Simondon 2017, p. 26). Thus, in an evolved technical object, all important parts “belong to the same system within which a multitude of reciprocal causalities exist” (Simondon 2017, p. 26–7). Put another way, the technical individual or machine is not this or that thing but a certain *schema of operation* that evolves by adapting itself to the regime of reciprocal causalities that holds in its associated milieu.

Having said that, the process of adaptation-concretization is not a mere defensive reaction to a pre-existing environment. Rather than simply being conditioned by an already given milieu, the technical object conditions the birth of a *new* milieu of a *middle* order of magnitude (i.e., its associated milieu). In other words: In the process of adaptation-concretization, the machine negotiates its own terms of existence by mediating or resolving an incompatibility between two heterogeneous orders of magnitude, the technical and the natural (“geographical”), thus conditioning the birth of a “third techno-geographical milieu,” which consists of a mixture of technical and natural elements and powers (Simondon 2017, p. 58). The machine-milieu system is further characterized as a *regime of reciprocal exchanges* in and through which the powers (technicities) of technical and natural elements come to be modified in their mutual reactions (Simondon 2017, pp. 26, 26–7). The machine, in other words, conditions itself by conditioning the environment that it comes to depend on for its operation and development. Even so, Simondon emphatically insists that the associated milieu is not a mere fabrication. This is because, by allowing a part of the natural world to intervene as its condition of functioning, the evolved machine loses some of its artificial character and becomes “part of the system of causes and effects” (Simondon 2017, p. 49). Simondon is emphatic about the machine’s strange dependence on its associated milieu, because it is what secures its relative autonomy. For even though the technical object is invented by humans, it cannot be reduced to a mere product of human intention. For, as soon as the technical individual or machine is coupled to its environment, and thus inserted into the more-than-human world of reciprocal causes and effects, it continues to be invented and to evolve in ways unforeseen by its makers.

Simondon is renowned for his ontogenetic take on technical objects. Yet, there is more to his philosophy of technology than the theory of technical individuation. *Mode of Existence* also provides an ample number of clues for a theory of *technical mediation*—a theory of how the technical object contributes to the understanding and individuation of *other* realities.

To appreciate the full scope of technicity, therefore, we need to consider the impact of technicity on other beings, including on human existence and the relation of human to nature. As Simondon points out, technicity takes on a broader philosophical significance due to the way it “intervenes as mediator between [hu]man and the world” (Simondon 2017, p. 183). Technicity does this by building intermediate structured worlds through which the relation of human to nature “takes on a status of stability, of consistency, making it a reality that has laws and an ordered permanence” (Simondon 2017, p. 251). Technicity impacts human existence by provoking a phase shift or change of level in the human-world system, thus releasing new potentials for development and action that were not accessible to the less evolved system.

3.4. Bodies and Machines as Adaptive Mediators

Simondon’s theory of technical mediation is further developed in his 1965–66 lecture series on imagination and invention (Simondon 2014). His approach to images and imagination differs from established approaches (e.g., Sartre 1962, 1972) in that it refuses to identify images with human consciousness and intention. In Simondon’s view, images are external (or at least partly so) to the thinking subject, being concerned, rather, with the action potentials of living bodies. Conceived as intermediate realities between subject and object, images enjoy a relative independence from conscious and intentional activity. Simondon’s approach differs also in that it refuses to identify images with unreality (or at least not exclusively). Images are defined, rather, as *mediators* that help establish the vital, reciprocal linkages that allow the living being and its environment to form a joint system (Simondon 2014, pp. 7, 92). This implies, among other things, that images are not understood as entities that represent, present, or intend some external object. Images are appreciated, rather, for their *adaptive role*. The definition given for an image is a broad one: “Everything that intervenes as an intermediary between subject and object can take on the value of an image and play the role of prosthesis, at once adaptive and restrictive” (Simondon 2014, p. 12, my translation). This means that a great many things can play the role of images or adaptive mediators, including living bodies and technical machines. The eco-operational approach to images and imagination has far-reaching implications. For one, imagination is no longer conceived in opposition to perception (as it continues to be in Sartre). Instead, images and the imagination are understood to prepare the living being for its encounter with the environment.

The lecture series on imagination and invention differentiates between *motor images* and *object images*. Motor images are the most elementary kind of images, as they concern the behavioral dispositions of the living body or parts of the body. Emphasizing the primacy of motricity over sensibility, Simondon claims that before experience there is *anticipation* of experience in the form of organized initiatives on the side of the living organism. Simondon mentions as an example the instinctual behaviors of a young honey buzzard, which, when held in captivity, exhibits movements adequate for catching bees and wasps even in the absence of the relevant environmental stimuli. The point of this example is that the living being comes equipped with a reserve of motor images, which Simondon further characterizes as complex *schemas of action* or *schemas of behavior* that are acted out spontaneously (Simondon 2014, p. 32, my translation). This implies that, instead of passively waiting for stimuli to impinge upon its receptors, the living being actively anticipates these stimuli. This also implies that the living being has the capacity to play out and explore its action potentials as if in a “free state” (Simondon 2014, p. 19, my translation).

For all that, in their undeveloped phase, motor images are but partial programs of comportment that need the refinement that comes with experience. According to Simondon, motor images undergo a development that consists of four stages: anticipation, experience, systematization, and invention. While anticipation is a crucial first step, allowing the living being to forge vital linkages with its environment, it is not until the second stage, that of *experience*, that motor images become “a mode of receiving information from the

environment” (Simondon 2014, p. 19, my translation). This is the stage where the living being interacts with its environment, and where motor images become “effectively and directly operational” (Simondon 2014, p. 19, my translation). Experience, in turn, sets off a process of adaptation through which motor images “organize and stabilize themselves into internally correlated groups along the dimensions of the relationship between the organism and the environment” (Simondon 2014, p. 19, my translation). This is the third stage of *systematization*, where the various motor images become integrated and develop into stable dispositions for action. The process of adaptation and systematization leads to the fourth and final stage, that of *invention*, which effects a transfer to a new level of the organism-environment system by installing new general dispositions, or as Simondon puts it, new “long-term anticipations” (Simondon 2014, p. 62, my translation). The installment of these more evolved anticipations releases new potentials for action, which in turn lead to more evolved experiences, systematizations, and inventions, and so on. The development of motor images, in other words, takes the form of an *amplification cycle* through which the organism-environment system gains new readinesses for action.

In their role as adaptive mediators, motor images do concept work in the sense that they resolve tensions between the living organism and its environment. However, there are situations where the living being faces problems that cannot be resolved through modifications of bodily dispositions alone, and that require recourse to what Simondon calls “heterogeneous mediations” (Simondon 2014, p. 141, my translation). These are situations where an independently existing object (most typically a created object) is used as an adaptive mediator. A simple example would be the use of a bucket to carry water over some distance, a task for which the human body is not very effective. Simondon refers to such mediators (in this case, the bucket) as “object images” (Simondon 2014, pp. 13, 142, my translation). Object images allow the human being to handle phenomena from extremely disparate orders of magnitude (the very small, large, heavy, hot, cold, toxic, corrosive, etc.) as if these phenomena belonged to an order homogeneous to its own. The introduction of an object image (say, a lever) induces an inventive phase shift in the human-world system by initiating a new middle-order regime of reality in which a new readiness for action comes to prevail: Equipped with a lever, the human being can lift loads many times its own weight. In addition to tools and machines, Simondon’s list of object images includes artworks, monuments, clothing fashions, and proverbs in language. Indeed, by his lights, *all* created objects or artifacts are to some extent adaptive mediators.

As already hinted, Simondon’s lecture series on imagination and invention endorses the hypothesis of a “primitive exteriority of the image in relation to the subject” (Simondon 2014, p. 7, my translation). This means, among other things, that images *tend to materialize and become institution*—in the case of motor images, by stabilizing into bodily dispositions for action. Object images, on their side, are mediations that materialize into detachable artifacts that, due to their independent existence, can be shared and transmitted on an altogether new scale: The detached existence of object images allows them to be used—and in a sense, come back to life—again and again, far from the time and place of their creation. Here, we touch on another takeaway from the lecture series, which concerns how materialization facilitates the process of formalization, allowing images to become (metastable) law. Simondon puts it thus: “Any image is susceptible to be incorporated into a process of materializing or idealizing recurrence” (Simondon 2014, p. 13, my translation). This means that, independent of whether we are dealing with motor images or object images, the development of images amounts to a *process of formalization* through which the images become institution by stabilizing into a behavioral pattern that tend to recur. Again, materialization furthers the formalization process, which may happen in one out of two ways: either through *incorporation*, as in the formation of new bodily habits; or through *externalization*, as in the formation of independently existing artifacts. What this all means is that there is something *general* about motor images and object images. Still, they are not general in the sense that Kantian concepts are general—but nor are they singular in

the Deleuzian sense. They are something in-between. It is no coincidence, therefore, that Simondon interchangeably refer to images as *schemas* of action or behavior.

In Simondon's 1958 thesis on technology, technical objects are specified precisely as *technical schemas* and discussed in terms of their *technicity*. At the micro-level, technicity concerns the stable behaviors of technical elements, their "capacities for producing or undergoing an effect in a determinate manner" (Simondon 2017, p. 75). These are the behaviors or powers that come to be modified or concretized when technical and other elements are combined and incorporated into a technical individual or machine. At the mid-level, technicity concerns the schema of operation that marks the individuality of a certain machine (say, a gasoline engine), and that continues to develop across the evolutionary series of related machines.

In *Mode of Existence*, when Simondon describes how technical elements come to be incorporated into the machine, he draws an analogy with the integration of organs in the living body. This is not a solitary incident: Throughout the thesis on technology and the lecture series on imagination and invention, parallels between living bodies and technical machines abound. Bodies and machines are both defined as beings that operate, and both are understood to depend on their associated environment for their operation and development. I take the view that these parallels prepare the ground for a broad take on technicity, which allows us to talk about the *technicities* of living bodies just as much as of the *lives* of machines. I pursue this broad take on technicity, not to trivialize the differences between living beings and machines, but to advance technicity as an integral and operational notion of concept or generality that stakes out a middle path between Kantian representational generality and Deleuzian concrete singularity.

4. The Operationally Real

While it resonates closely with ontological approaches, such as Deleuze's, the eco-operational approach advocated here points in a different direction. Instead of a metaphysics as such, it offers a theory of mediation that foregrounds the *ontological import* of technical apparatuses broadly construed—their power to institute and shift realities in non-trivial ways. The Deleuzian and the eco-operational approach both draw on Simondonian motifs, the former on the preindividual and the latter on technicity. However, while both notions relate to the theory of individuation, different understandings of the virtual can be extrapolated from them—the notion of technicity paving the way for what I call *the operationally real*.

By affirming the technicity of thought and being, the proposed approach carves out a new domain of reality, that of the operationally real, which amounts to a new theory of the virtual. The new domain does not fit into established philosophical categories, as it is neither immanent nor transcendent but rather marked by its in-betweenness. This observation leads to a first characterization of the new domain: The operationally real is an *intermediate reality* instituted and sustained by the mediating or resolving action of some technical apparatus (e.g., a living body or a technical machine) that plays the role of adaptive mediator. This implies that the operationally real is a *mixed* environment of a *middle* order of magnitude—a complex milieu made up of heterogeneous and conflicting elements and powers that have been brought into communication by technicity. Still there is more to be said about this strange new domain and the role of technicity in upholding it.

The operationally real is a *phase*, or better, a *partial and relative resolution* of a larger metastable system of being. As we have seen, in the eco-operational view, a metastable system of being, such as the individual-environment coupling, is an oversaturated system made up of tensions and tendencies that by far exceeds those currently in operation. Individuation occurs in such a system as a discovery of compatibility. The intervention of technicity resolves tensions by redistributing the system's elements and powers—thus providing the structuration that forms the basis of the metastable equilibrium that marks a new phase in the system. Consequently, the process of individuation is not so much an "actualization of a virtuality" as an operation that goes "from metastable state to metastable

state by means of successive inventions of structures" (Simondon 2017, pp. 168, 169). This all means that the operationally real encompasses only a selection of the efficacious powers that make up the system of being, namely those that are summoned into operation—and hence into reality—in its current metastable state.

The operationally real is a *recurrent regime of reciprocal causalities*. Notwithstanding that it is mixed, partial, and relative, the reality built by technicity is a structured world made up of behavioral patterns that tend to recur. The coupling between an individual and its associated environment installs a new causal regime where conflicting forces come to modify each other as they stabilize into reciprocal exchange relationships. The operationally real, therefore, is identified by a certain recurrence of causality that orchestrates the operational powers of the system in a characteristic way. This implies that technicity has a normative aspect: The installment of a new causal regime marks a new normal in the individual-environment system, as it allows the individual to follow a new norm of life. This is also the case in heterogeneous mediations, where the use of an independently existing artifact (e.g., a lever) as adaptive mediator effects a transfer to a new level of the human-world system in which new behaviors become possible.

The operationally real is an *Umwelt* in the eco-operational sense outlined above, i.e., a *metastable surrounding world of possible actions*. The proposed approach defines the technical individual or machine as a *schema of operation* that remains open to its surrounding environment and correlative with it—much along the lines of the Merleau-Pontian body schema. In both cases individuation is seen as a mediate process of amplification in and through which the individual-environment system gains new readinesses for action. Thus, at each step of the process, a new operational reality is established. The operationally real is made up of behavioral dispositions or long-term anticipations that allow the individual to adopt a certain posture toward the world, a certain inclination to act in a particular way. This helps specify the mediating or resolving action of adaptive mediators: They operate by offering a new organization of the surroundings that situates the individual in a new configuration of possible actions.

After having made these characterizations, a central question remains: In what sense does the operationally real amount to a theory of the virtual? In what sense is it real and in what sense virtual? The eco-operational approach equips us with an eco-operational understanding of the real, which is also what opens new avenues into the virtual: *To be real is to be efficacious*. This is how a technical object, which starts out as artificial (in Simondon's terms, "abstract"), can become more real or natural (in Simondon's terms, "concrete") in the course of its development. The use of an independently existing artifact as adaptive mediator creates a mediation between human and nature "that gives its human content a structure comparable to that of natural objects, and [that] allows for the integration of this human reality into the world of natural causes and effects" (Simondon 2017, p. 51). Thus conceived, "the artificial is something natural that has been solicited, not something false or human that has been mistaken for something natural" (Simondon 2017, p. 260). Since we are dealing here with a reciprocal exchange relationship, this process also goes the other way. In Simondon's terms, the technical schematism establishes a "convertibility of the human into the natural and of the natural into the human" (Simondon 2017, p. 251). The technical world is a "system of convertibility" that "puts into play the veritable laws of natural reality" (Simondon 2017, pp. 251, 260). The technical operation, therefore, is not arbitrary. This also implies that, even though the technical object is invented by humans, the *evolved* technical object is more-than-human and more-than-technical—and so are the operational realities it gives rise to.

In the proposed approach, a technical object is real (efficacious) to the extent that it serves as an adaptive mediator that opens a new world aspect, a new surrounding world of possible actions. This means that to invent a technical object is to "prepare an availability" (Simondon 2017, p. 251). The adaptive mediator operates by instituting and sustaining an intermediate reality that takes the form of an *Umwelt* in which certain actions are *really possible*—independent of whether they are acted out or not. This is the operationally real,

which is a domain constituted by *real* possibilities, by *actual* potentials. Thus conceived, it conforms neither to the classical possible-real opposition, nor to the Deleuzian virtual-actual pair. It resonates more closely with Peirce's definition of the virtual in terms of actual efficacy. The operationally real is virtual and actual at once, not because the object consists of two halves (a virtual half and an actual half) that mutually influence each other (as in one interpretation of the Deleuzian virtual-actual distinction), but because it consists of behavioral dispositions or schemas that are *actual* only in a highly specific *operational* sense of the term, namely that of being *ready to operate*. These dispositions or schemas are precisely *long-term anticipations*: They instill in the individual a certain readiness—a certain directedness and openness—toward the surrounding environment. This understanding of the actual differs markedly from the Bergsonian understanding of the actual in terms of a cessation of movement through which the individual becomes insular (as discussed in Section 3.1).

There is no space here to undertake a full comparison between the Deleuzian and the eco-operational notions of the virtual. I restrict myself to single out two points at which the two approaches diverge. The first point concerns individuation: While Deleuze conceives individuation as an actualization of a virtuality, the eco-operational approach conceives it instead as a stepwise process that goes from one metastable and actual (in the operational sense) state to the next. This is a subtle difference, but one that has implications. For one, it influences how the two approaches understand novelty. While Deleuze identifies the virtual with duration, and hence, with the *continuous* creation of *unforeseeable* and hence *radical* novelty; the proposed approach identifies the virtual with the action potentials that are released as the result of *discontinuous* alterations in the form of inventive phase shifts that effect a transfer from one normal state to another. As indicated by the notions of *anticipation* and *amplification*, the novelty created by technicity is but a *relative* novelty—one that is neither completely unforeseeable nor completely foreseeable. For as Simondon points out, in every true invention, there is a “leap, an amplifying power that goes beyond simple finality” (Simondon 2014, pp. 171–72, my translation). The second point I want to make is closely connected to the first and has to do with mediation: While Deleuze identifies the virtual with the preindividual, the operationally real is an always already individuated—and hence mediated—reality. In the eco-operational view, which draws on an organism-environment model, there is no preindividual being in the pure sense, and hence no domain of pure difference in itself. The operationally real is a mixed reality, a virtuality instituted and sustained by mediation. However, as indicated by the notions of *technicity* and *transduction*, we are dealing here with *mediation* in an altogether new sense of the term, namely that of a general method for the resolution of tensions between individual and environment.

Having made these points, we are now in a better situation to understand how and why Deleuze and Simondon seem to disagree over the nature of disparateness (as noted at the end of Section 2). We now see that Simondon does *not* require that disparate series *resemble* one another for them to constitute a joint system. Instead, what he requires is that there is something—an adaptive mediator or a praesenti concept—that *grounds* the coupling of the series, that resolves tensions by instituting a new middle-order regime that enables elements and powers that belong to extremely disparate orders of magnitude to interact and communicate. As Simondon makes clear, there is a movement toward the middle, not because we are concerned with “a degradation that tends toward homogeneity” (as Deleuze seems to suspect), but because the in(ter)vention⁸ of an adaptive mediator “make[s] the extreme terms [of the disparate series] compatible” (Simondon 2014, p. 88, my translation).

5. Concluding Remarks

This article elaborates a conceptual framework that puts technical mediation at the center of epistemology and ontology. The argument is that technical apparatuses—in their role as adaptive mediators—do the work of concepts, and further, that they facilitate,

provoke, or drive processes of individuation. At the heart of this framework is the notion of technicity, which is the name given to the resolving and normative action undertaken by apparatuses. The argument is, more precisely, that technical apparatuses serve as quasi-Kantian conditions of knowledge. However, since the subject-object model has now been replaced by a reciprocal organism-environment model, a very different understanding of mediation or concept work results. The proposed framework provides an approach that no longer adheres to the Kantian distinction between the senses and the intellect. Instead, it advances technicity as an integral and operational notion of concept or generality that is no longer conceived in opposition to sensibility.

The eco-operational theory of technical mediation puts forward a new notion of concepts that forges a middle path between Kantian representational generality and Deleuzian concrete singularity. What are these concepts? In Kant, concepts (of pure understanding) are general ideas or representations. In Deleuze, concepts are singular Ideas, no broader than the things they account for. In the proposed approach, concepts are not ideas at all, but rather *styles of behavior*. Concepts are images or schemas (in the sense established in Section 3.4): characteristic and recurrent modes of action expressed by some apparatus. Thus conceived, concepts are not general in the Kantian sense but still more-than-singular. Instead of a *representational* generality, we are concerned with a *dispositional* generality. Where are these concepts? As they are identified with the action potentials of apparatuses, concepts are external to the subject, enjoying a relative independence from human intentional activity. Nevertheless, even though they are expressed by apparatuses that exist materially, eco-operational concepts are defined less by their materiality and more by their activity. That said, materialization (either through incorporation or externalization) furthers the formalization process through which concepts acquire an organizational power—allowing them to come alive as long-term anticipations. What do these concepts do? In Kant, concepts are a priori conditions that determine their objects by subsuming them under themselves. However, since concepts and sensible intuitions are entirely un-homogeneous (or so Kant’s argument goes), a third thing is needed—a transcendental schema—that is homogeneous with both and thus allows the former to be applied to the latter. In the eco-operational view, by contrast, concepts *are* schemas, more precisely operational schemas that serve as adaptive mediators. Thus conceived, concepts are a praesenti conditions of knowledge that resolve tensions by enacting an informative and interactive communication between disparate orders of magnitude. Technical mediation, therefore, is not about matching realities (resemblance); it is about initiating new ones—new operational realities, new configurations of possible actions.

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Notes

- ¹ Peirce has made significant contributions to an operational epistemology and ontology (including to an operational notion of the virtual), which, due to limitations of space, are only hinted to in this article. I have discussed some of these contributions elsewhere, focusing especially on his notions of operational iconicity and diagrammatic evidence (Hoel 2012, 2016). While this article concentrates on the contributions to an operational framework of a certain lineage of ecological thinkers, Wilson (2021) outlines an alternative and complementary lineage, which includes more detailed considerations of Duns Scotus and Peirce.
- ² Alluding to the title of Deleuze’s book, I am using the term *Bergsonist* here instead of, say, *Bergsonian*. I do this to indicate that, even though Deleuze’s book on Bergson engages with the latter’s work, the position developed is just as much Deleuze’s as it is Bergson’s.
- ³ What Simondon argues is that to understand the exchange of signals, we must consider the special fitness or aptitude of the signals for being received as such by a certain system. As understood by Simondon, the aptitude of signals is not a quality but a

relation. This implies that there must be something that *grounds* it—a certain “schema of foreseeability” according to which the modulated energy becomes meaningful signals (Simondon 1964, p. 255, my translation). For all that, we are not talking here about Kantian mediation. For the signals to be integrated as meaningful information in the receiving system, they cannot be a mere repetition of the same (in which case there would be no information), but nor can they be absolutely new. To illustrate this, Simondon evokes the example of binocular disparation in perception, which demonstrates that, for the depth effect to occur, the retinal image of the left eye cannot be identical to that of the right – but nor can it be completely different.

⁴ As mentioned (in Section 3.1), Simondon transformed the notion of information in transductive terms. Along the same lines, he sought to develop a reformed cybernetics. See for example the entries on allagmatics, information, and universal cybernetics in Barthélémy (2012). A discussion of Simondon’s reception of cybernetics is also given in Chabot (Chabot 2013). The relevance of Simondon’s philosophy to contemporary software development is explored in Rieder (2020).

⁵ The prefix *eco-* may also raise questions as to how the proposed approach relate to other approaches with the same prefix (e.g., eco-philosophy, eco-feminism, and eco-criticism). While the *eco-* in *eco-operational* is partly metaphorical, indicating that the subject-object model of knowledge has been replaced by a reciprocal organism-environment model, there are also affinities between the proposed framework and contemporary approaches that are concerned with the unfolding climate crisis. For one, there is a shared tendency to challenge received ideas about culture and nature, the human and the non-human, which may in turn enable new forms of political engagement and activism.

⁶ See for example Canguilhem’s essay “Organism and Machine” in Canguilhem (2008).

⁷ “La machine est un être qui fonctionne.” While in the English translation the verb *fonctionner* is translated as *to function*, I prefer to *operate* to emphasize the overall operational orientation of Simondon’s philosophy.

⁸ For a more detailed discussion of how technical mediation involves both intervention and invention (“in(ter)vention”), see Hoel and van der Tuin (2013).

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