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Revolution Backwards: Functional Realization and Computational Implementation

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Functionalist theories of mind come from heterogeneous directions and address an array of problems ranging from metaphysical to epistemic-semantic and engineering ones. Similarly, computational theories of mind cover different classes of computational complexity. The first part of this text examines what it means to combine the functional description of the human mind with the computational one. The second part addresses the ramifications of a computationalist-functionalist account of the mind as exemplified in Alan Turing's proposal for realizing intelligent machinery. The implementation of a computationalist-functionalist account of the human mind in machines is depicted as a program that deeply erodes our capacity to recognize what human experience manifestly is. In doing so, it fractures the historical experience of what it means to be human. Yet this is a rupture that marks a genuine beginning for the history of intelligent machines.

In *Alleys of Your Mind: Augmented Intellligence and Its Traumas,* edited by Matteo Pasquinelli, 139–54. Lüneburg: meson press, 2015.
DOI: 10.14619/014

Function, Computation, and their Alliance

Traditionally a thesis in the philosophy of mind, functionalism is a view of the mind as a functional organization. It attempts to explicate what the mind does and how it does it by reference to functional roles and properties that can be causal or logical-conceptual. In this sense, functionalism conjoins (a) *the metaphysical problem* of describing causal relations between explanans and explanandum in functional terms of selection and purpose-attainment (i.e., the function as what—according to specific and relevant selection criteria—makes a difference in explanandum) with (b) an *epistemic-semantic problem* concerning how to differentiate semantic content from physical information and how to view the semantic intercontent in terms of functions as logico-conceptual roles with (c) *an engineering problem* regarding the realization of functional properties in relation to or in isolation from structural properties.

Computationalism is a view that the functional organization of the brain is computational or implements computation, and neural states can be viewed as computational states. In this context, computation can refer to either *intrinsic computation* (i.e., computation detached from the semantics of utility implicit in algorithms), or *logical computation* (in which processes implicitly implement algorithms to yield specific outputs). While analysis in terms of intrinsic computation attempts to detect and measure basic spatio-temporal information processing elements without reference to output states or the information produced, analysis in terms of algorithmic computation is based on the identification of output states and then singling out processes which algorithmically map input to that specific output.

Intrinsic computation is about how structures actually support and constrain information processing, how regularities are formed and how structures move between one internal state to another, and in doing so, oscillate between randomness and order (i.e., the inherent association between structural complexity and intrinsic computational capabilities of processes). Whereas algorithmic computation is concerned with the mapping between input states and output states (or states and actions), and how this mapping relation can be seen as a pattern or a compressed regularity that can be captured algorithmically. Hence, from the perspective of algorithmic computation, a machine or a brain computes a function by executing a single or a collection of programs or algorithms.

In reality, neither functionalism nor computationalism entails one another. But if they are taken as implicitly or explicitly related, that is, if the functional organization (with functions having causal or logical roles) is regarded as computational either intrinsically or algorithmically, then the result is *computational functionalism*.

Depending on what is meant by function (causal or logico-conceptual) and depending on what is meant by computation (intrinsic-structural or algorithmically decomposable), bridging functionalism with computationalism leads to varieties of positions and approaches: rational or normative functionalism with structural constraints (Sellars 2007), strongly mechanistic/causal functionalism (Bechtel 2008), rational functionalism with a level of algorithmic decomposability (Brandom 2008), normatively constrained functionalism with intrinsic computational elements (Craver 2007), strongly logical functionalism with algorithmic computationalism (classical variations of artificial intelligence), causal functionalism with intrinsic computationalism (Crutchfield 1994), weak logical functionalism with intrinsic computationalism and strong structural constraints (artificial intelligence programs informed by embodied cognition) and so on.

Even though this might be a controversial claim, in recognizing thinking as an activity that ought to be theoretically and practically elaborated, philosophy turns itself into an implicitly functionalist project. A philosopher should endorse at least one type of functionalism insofar as thinking is an activity and the basic task of the philosopher is to elaborate the ramifications of engaging in this activity in the broadest sense and examine conditions required for its realization. Pursuing this task inevitably forces philosophy to engage with other disciplines, and depending on its scope and depth, it demands philosophy to rigorously acquaint itself with social and natural sciences, political economy as well as neuroscience, computational linguistics as well as evolutionary biology.

The mind is what it does. While this *mental* or *noetic doing* can be taken as constrained by the structural complexity of its material substrate, it should be described in the functional vocabulary of activities or doings. The mind—be it taken as an integration of distinct yet interconnected activities related to perception, thinking, and intention or seen as a cognitive-practical project whose meanings and ramifications are still largely unknown (à la Hegel and Mou Zongsan)—has primarily a functional import (see Mou 2014).

Identifying the mind as a thing is a move toward rendering the mind ineffable, since it flattens the specific conditions and constraints (whether material or logico-conceptual) necessary for the realization of the mind, and thereby, confers primordial and perennial qualities on it. The mind becomes the given. But characterizing the mind in terms of role-specific activities or functions is the first step for preventing the mind from becoming ubiquitous to such an extent that it turns ineffable. This is because by defining the mind in terms of activities, we are forced to explain how these activities are realized, what sorts of processes and structures constrain and support them, and what roles these activities play.

This functional decomposition or analysis then provides us with additional information regarding if what the mind appears to be doing is indeed a single activity or is in fact comprised of diverse and qualitatively distinct activities with specific roles and domains in or outside of what we previously viewed as a unitary picture of the mind. In other words, seeing and examining the mind in terms of function not only forestalls ineffability but also leads to a systematic destruction of a reified picture of the mind. In this sense, the functional description of the mind is at once a critical and a constructive gesture. It is critical because it subjects whatever we understand as the mind to a functional analysis or methodical decomposition. Abilities are distinguished by activities which realize them and activities are differentiated by their roles and investigated in light of conditions required for their realization: distinct processes with their own pattern-uniformities, hierarchies of structural complexity with their intralevel and interlevel constraints and dependency relations between constituents, different classes and types of function, etc.

Accordingly, the functional description is able to reveal not only what those activities we associate with the mind are and which roles they play, but also how they are organized and realized. Looking deep into the functional organization and conditions of realization, what was previously deemed as a single activity may turn out to be multiple qualitatively distinct activities or multiple activities may turn out to be a single one. Therefore, the analytical research launched by the functional description leads to a fundamental reevaluation of the nature of cognitive activities and thus, culminates in a drastic change in what we mean by mind-specific activities including thinking.

Now insofar as this analytical investigation identifies and maps conditions required for the realization of mind-specific activities, it is also a program for the functional realization and construction of cognitive abilities. The extended functional map is a blueprint for realization. In other words, the functional description has a constructive import. It is in the context of functional description and functional realization that the role of computationalism and its connection with functionalism become explicit. If there is a computational description for a function, that function can—in principle and within the framework of the right paradigm of computation—be reconstructed through a machine or a system of interacting agents capable of implementing the relevant computation. In this sense, computational description is not the same as functional description, it is an account of functional realizability in computational terms combined with the different conditionals regarding the computability or incomputability of functions for a specific computational class as well as the paradigm of computation under which the computational complexity is defined.[1]

1 Even though the choice of the paradigm of computation is seldom discussed in the computational theory of mind or orthodox approaches to artificial intelligence, it is a

Combining functionalism with computationalism requires a carefully controlled merger. Based on their hierarchies, roles, and attachments with specific structures, different realizability conditions implement different types or classes of computation, some of which are computationally intractable to others. If by computationalism, we mean a general view of computation in which computation at the level of causal mechanisms and computation at the level of logico-conceptual functions are indiscriminately joined together and there is no distinction between different classes of computational functions or computational models with their appropriate criteria of applicability to algorithmic and non-algorithmic (interactive) behaviors, then nothing except a naïve bias-riddled computational culture comes out of the marriage between functionalism and computationalism. Within this culture, the prospects and ramifications of computational reconstruction of complex cognitive abilities are always polarized between an uncritical optimism and a dogmatic cynicism, claims of inevitability and impossibility.

Functional realization of cognition—whether viewed through the lens of embodiment or semantic complexity—may, in fact, be captured and reconstructed computationally. The analytic-constructive prospects of computational functionalism are open to examination and experimentation. However,

criterion that is particularly consequential for describing and modeling functions. Generally, computation is defined by reference to the Church-Turing paradigm of computation where the emphasis is put on how computation is sequentially executed and what is computable. However, the Church-Turing paradigm has been challenged in the past few decades in computer science by proponents of the interactive paradigm of computation such as Samson Abramsky and Peter Wegner among others. One of the main motivations behind this divergence was precisely the debates concerning what computation is as opposed to what is computable. Developed through intersections between proof theory, linguistics, foundational logic, physics and computer science, these debates have led to the theory of fundamental duality of computation where computation is defined as a confrontation between actions or processes. These interactions can be logically expressed by sets of axioms for elementary acts (for example, in the context of linguistic practices, these axiomatic actions can be elementary speech acts such as assertion, query, permission, etc). In the Church-Turing paradigm of computation, for a given system the influences of the external environment are represented by an average behavior. Any unpredictable behavior of the environment is registered as a perturbation for the system. A Turing machine shuts out the environment during the computation, and interaction is rudimentary represented through sequential algorithms. But interaction as in concurrent processes and synchronous or asynchronous actions between agents is irreducible to the sequential interaction as it is represented by distributed parallel systems. In contrast to the Church-Turing paradigm, the interactive paradigm considers computation to be the natural expression of the interaction itself. The behavior of the system evolves in response to and in interaction with the inputs from the external environment. This duality that is intrinsic to computation can be exemplified in games or collaborative, neutral and adversarial engagements between agents. Each move, strategy or behavior evolves in accordance with synchronous or asynchronous moves or behaviors of other parties. In other words, the computational operation is the interaction between agents which represent different strategies of action. For discussions surrounding the interactive paradigm of computation, see Goldin, et al. 2006.

this is only possible if conditions of realization are carefully differentiated and examined with reference to distinct modes and classes of computation. If the activities that count as thinking are taken as purely symbolic (cf. the investment of classical program of AI on symbolic algorithmic computation) or purely causal (cf. structural theories of the mind focused on intrinsic computation), the result will most likely be either an evidence of the impossibility of functional realization or the intractability of functional properties of the mind to computation (or it could even be both). But these evidences do not stem from the intrinsic resistance of the mind-specific activities to functional and computational descriptions. They are rather the results of improper and incompatible functional and computational descriptions (not having the correct computational description in the context of the adequate computational paradigm for the right functional description). Therefore, they cannot be treated as proofs against the functional realization of the mind (i.e., the idea that the mind can be reconstructed by different sets of realizers) or the computational description of its realizability (i.e., the idea that mind-specific activities can be realized by computational functions which can be implemented in artifacts).

Intrinsic computational modeling is suitable for causal-structural conditions of realization, whereas symbolic logical computation is pertinent to language at the level of syntax. But semantic complexity associated with conceptual and rule-following activities requires a different kind of algorithmic decomposability and that is specific to the social or interactive dimension of linguistic discursive practices through which the pragmatic mediation of syntactical expressions yield different layers of semantics and grades of concepts. Complex semantic abilities are acquired through dialogical aspects of language which involve interaction between agents or language-users.[2] Given that the logic and the evolving structure of the interaction itself is a fundamental aspect of computation and necessary for the realization of conceptual functions or concept-roles, complex cognitive abilities which involve semantic richness,

2 In traditional approaches to semantics, even though the semantic content is understood in terms of inference, the inference is only viewed with reference to the relation between the premise and the conclusion, or the monological relation between propositional contents. An approach to meaning via monological processes, however, does not capture the multilayered complexity of the semantic content. Content-richness or semantic complexity can only be obtained via dual interacting (arguing) processes when dynamically contrasted to each other. These dual interacting-contrasting processes describe the dialogical dimension of inference which is required for the dynamic appraisal and determination of semantic content as well as the generation of different semantic layers and grades of concept. The dialogical dimension of inference adds an interpersonal angle to the intercontent aspect of inference. It is this interpersonal or dialogical aspect that is expressed by the social discursive scope of reasoning and can be elaborated as a form of multi-agent computation. For a detailed study of dialogical approaches to meaning and inference especially in light of new advances in interactive logics and computational semantics, see Lecomte 2011.

resource-sensitive inference and dynamic structures require a paradigm shift in computational modeling. This shift should satisfactorily reflect the interaction itself as an integral and indispensable element of computation.

It is this irreducible and fundamental interactive-social dimension of the core components of cognition such as concept-use, semantic complexity and material inferences that the classical program of artificial intelligence in its objective to construct complex cognitive abilities has failed to address and investigate. Is the Church-Turing paradigm of effective computation with its widely discussed implications for algorithmic mechanizability a suitable candidate for modeling the interactive-social dimensions of cognition? Or is it inherently inadequate when its definition of computation is extended to include interaction in its evolving and non-monotonic sense that occurs in open systems, in dialogues or between asynchronous processes or collaborative and adversarial agents. But even more generally, can social linguistic discursive practices responsible for the semantic complexity be computationally described? Can computational descriptions of social-pragmatic dimensions of semantics and inferences be algorithmically captured considering that the computational description is not the same as the algorithmic description? And if they can indeed be algorithmically expressed, then what kinds of algorithms? If by computation we mean symbolic algorithms, then the answer is negative. But insofar as language is a form of computation and compression—albeit one in which compression is modified for communal sharing and interaction between agents and where different computational classes are combined and integrated—even the semantic complexity or meaning-relations of language can be "in principle" computationally generated.[3] An emphatic rejection of this possibility risks replacing the ineffability of the mind and its activities with the ineffability of the social and its discursive practices. However, in order to find and develop the appropriate computational models and algorithms of concept-formation and meaning-use, first we have to determine what sorts of activities a group of agents—be they animals or artifacts—have to perform in order to count as engaging in linguistic discursive practices.

The alliance between functionalism and computationalism takes the constructive implications of the former one step further—but a step that is in every respect a leap. If the functionalist account of the mind is already a blueprint for the realization and reconstruction of the mind, the functionalist *and* computational account of the mind is a program for the actual realization of the mind outside of its natural habitat, its implementation in contexts that we have yet to envisage. But this openness to implementation suggests a functional evolution that is no longer biological or determined by an essential structure.

3 For more details on computational compression and the social environment, see Dowe et al. 2011.

The history of functionalism has deep philosophical roots going back to Plato, to the Stoics (the functional account of emotions) and extending to Kant, Hegel, Sellars, Brandom, and Wimsatt. Similarly, computationalism has also a long history passing through scholastic logicians, the early mechanistic philosophy, the project of *mathesis universalis,* and in the wake of revolutions in mathematics and logics leading to modern computation and ultimately, the current advances in computational complexity theory and computational mechanics (as represented by figures such as Charles Bennett and James Crutchfield). However, computational functionalism—at least its rigorous elaboration—is a recent alliance. Among its forerunners, one name particularly stands out, Alan Turing. The significance of Turing's computationalist project is that it simultaneously pushes the boundaries of theory and experimentation away. Computational functionalism is presented by Turing as a theory that gestures toward its own realization and in fact, it is the theory that has to keep up the pace with the escalating rate of its concrete realization.

A Revolution that Writes Its Own Past

To continue and conclude this essay, I intend to briefly address the significance of the functionalist account of the human mind, and more specifically, Turing's computational-functionalist project as an experimentation in the realization of the thinking agency or the cognitive-practical subject in machines. As it will be argued, it is an experiment whose outcomes expunge the canonical portrait of the human backwards from the future. It originates a project in which humanity elaborates in practice a question already raised in physical sciences: "To what extent does the manifest image of the man-in-the-world survive?" (Sellars 2007, 386).

To this extent, I shall discuss the ramifications of Turing's response to to what are known as the "*arguments from various disabilities"* (henceforth, AVD) as an assault upon the canonical portrait of the human no less significant, in its theoretical and practical consequences, than the Copernican Revolution was in terms of shaking our firm views concerning the world and ourselves in it. In his groundbreaking essay *Computing Machinery and Intelligence*, Turing (1950) responds to and challenges a number of oft-repeated objections against the implicit albeit fundamental assumption of computational-functionalism, namely, the possibility of the realization of a machine that is able to computationally implement functions we regularly associate with human experience such as perception, cognition, and intention.

Machines cannot think, machines cannot have emotions, machines cannot be purposeful, they cannot be proactive and so forth: Turing (1950) enumerates these under what he calls AVD. It is a sort of *straw machine argument* that is baseless and precarious. It is more a fruit of our psychological fears and residual theological approaches to the world and ourselves than the result of sound arguments.

As a supporter of arguments against machines' abilities, the mind-preservationist is a person who believes that the mind cannot be functionally realized and implemented in different substrates. The mind-preservationist not only rejects the functionalist realization of the mind but also, as a result, adopts a form of vitalism or ineffability of the human mind. The mind-preservationist always attempts to see the machine's abilities from the perspective of an endemic disability. But if what the mind-preservationist really dismisses is not the machine as such but instead the functional realization of the mind implemented in the machine, then what he actually denies is not the machine *per se* but the mind itself. Or more accurately, what the mind-preservationist ends up rejecting is the possibility of mapping the mind's functions, the possibility of modeling and defining it as an object of a thoroughgoing scrutiny. In short, the mind-preservationist resists seeing the mind as what it really is.

The mind-preservationist turns an epistemic quandary regarding identifying conditions required for the realization of the mind (what makes the mind mind) into an ontological position concerning the impossibility of realization. If the mind-preservationist simply says that we do not know how these sorts of abilities we associate with the mind—or more generally, the human experience—are realized, he then can not strictly deny the possibility of the realization of these abilities in a machine. Why? Because that would be simply a form of provisional agnosticism that does not warrant rejection; he then has to yield and agree to the possibility of a future—even though a very distant one—where both epistemic requirements and technical criteria of the machine-implementation are fulfilled. Consequently, the mind-preservationist has to lend an ontological status to this epistemic uncertainty so that he can turn a tentative reaction into a decisive negation, crushing a future plausibility (the possibility of an adequate functional picture and means of implementation) in favor of an everlasting implausibility.

In this sense, machine-denialism is simply an excuse for denying what the mind is and what it can be. Correspondingly, disavowing the pursuit of understanding the mind coincides with acting against the evolution of the mind, since from a pragmatic-functional viewpoint the understanding of the meaning of the mind is inseparable from how the mind can be defined, reconstructed, and modified in different contexts. Therefore, if we lack the definition of the mind which is itself a map for its realization and implementation, then how can we so eagerly rule out the possibility of a machine furnished with a mind? The mind-preservationist, accordingly, has a double standard when it comes to recognizing the mind as both the measure and the object of his critique. He says the machine cannot engage in mental activities as if he knows what the mind really is and how it is realized. However, if he does not know the answers to these questions, then he cannot approach the realizable-implementable account of the mind from the perspective of an intrinsic disability or impossibility.[4]

If you do not know what the mind is then how can you claim that the machine cannot possibly have a mind? With the understanding that the "what" posed in this question is the very map of the mind's functional realizability that can be implemented in machines. Here, "what" can be described functionally as those *activities* that define what the mind is. The mind is therefore described as a functional item, in terms of its capacities for mentation (i.e., engaging in mental activities). From a functionalist perspective, *what* makes a thing a thing is not what a thing is but what a thing does. In other words, the functional item is not independent of its activity.

The activities of the mind are indeed special in the sense that they are not ubiquitous. But as Bechtel (2008, 3) suggests it is not in spite of being comprised of mechanisms but *in virtue of* the right kind of mechanisms that the mind is special and its activities have distinctive characteristics. This specialty is not the result of some sort of ineffability or exorbitant uniqueness: It is a corollary of a proper organization of right kind of realizers.

For this reason, if the argument from the perspective of disabilities is adopted as a standard strategy toward machines, or if it is exercised as a pre-determined reaction to the possibility of the realization of the mind in different substrates, then it does not have a genuine critical attitude. Why? Because such a critical strategy then has implicitly subscribed to a preservationist view of the mind as something inherently foreclosed to mapping and (re)construction. The mind that it safeguards has a special status because it is indescribably unique at the level of mapping and constructability. It cannot be constructed, because it cannot be fully mapped. It cannot be mapped because it cannot be defined. It cannot be defined because it is somewhere ineffable. If it is somewhere ineffable, then it is everywhere ineffable. Therefore, the singularity of the mind is the effect of its ineffability. If we buy into one ineffable thing and if that thing happens to be central to how we perceive, conceive, and act on the

4 An early proponent of functionalism, Hillary Putnam later repudiates his earlier position in his work *Representation and Reality* (1988). Putnam simultaneously rejects the functional and computational aspects of computational functionalism by constructing an argument that draws on Gödel's incompleteness theorem against the computational description of rational activities as well as demonstrating the triviality condition implicit in the multiple realizability thesis. The latter part of the argument has been criticized as being only an attribute of what is now called a standard picture of function. In *Gödel, Putnam, and Functionalism*, Jeff Buechner (2008) presents a meticulous refutation of Putnam's argument from the perspective of the incompleteness theorem, both with reference to the application of Gödel's theorem and the conclusions drawn from it. And for criticisms of the argument from the perspective of the triviality condition, see Huneman 2013.

world and ourselves, then we are also prepared to regard many other things in the world as ineffable. We have thus committed ourselves to a full-blown mysticism.

Turing's program signals a consequential phase in the historical development of the human and defining the project of humanity in the sense of both determining the meaning of being human and updating its definition. Its importance lies in how it grapples with the most fundamental question posed by Kant (1885, 15): "What is Man?" or what does it mean to be human?

Unlike the Copernican, Darwinian, Newtonian, and Einsteinian revolutions in which we witness the consequences of a radical theoretical reorientation immediately manifesting itself in the present, the site of the Turingian revolution is always in the future. Put differently, the Turingian revolution does not happen here and now in that it is, properly speaking, a constructive theory of the mind as implicit in computational functionalism. It incrementally (from the perspective of here and now) and catastrophically (from the perspective of the future) alters both the meaning of the mind and the conditions of its realizability by implementing—step by step, function by function, algorithm by algorithm—the functional picture of the mind in machines. For this reason, the concept of revolution that Turing's project elaborates fundamentally differs from the trajectory of the Copernican revolution as the harbinger of modern theoretical sciences.

The Turingian revolution suggests that the future will not be a varied extension of the present condition. It will not be continuous to the present. Whatever arrives back from the future—which is in this case, both the mind implemented in a machine and a machine equipped with the mind—will be discontinuous to our historical anticipations regarding what the mind is and what the machine looks like. In a sense, the relation between what we take as the mind and the machine-realizable account of the mind is akin to what René Thom describes as the catastrophic time-travelling relation between the image and its model, the signifier and the signified, the descendant and the parent. In the signified-signifier interaction, the dissipative irreversibility of time disguises a principle of reversibility (conservation) that is operative behind it:

> The formation of images from a model appears as a manifestation of the universal dynamic having irreversible character. There is a self-ramifying of the model into an image isomorphic to itself. Yet very often this process utilizes an interaction of reversible character. . . . The signified generates the signifier in an uninterrupted burgeoning ramification. But the signifier regenerates the signified each time that we interpret the sign. . . . For the signifier (the descendant) to become the signified (the parent) again, the time-lapse of a generation is sufficient. (Thom 1983, 264)

The relation between the human and its computational image becomes that of the signified qua the parent and the signifier qua the descendant. It illustrates a process whereby the future, time and time again, baits the present: The image of a mollusk is engraved on a rock and soon supersedes it. An embryo grows and develops a structure that is isomorphic to its parent organism but one that has undergone extensive time-space translations. As the human imprints and proliferates its image in machines, the machine reinvents the image of its creator, re-implements, and in the process revises it.

To the extent that we can not adopt a mind-preservationist ideology without undermining ourselves and to the extent that the computational-functionalist account of the mind is open to further epistemic and technical achievements, our pursuits for the realization of the mind in machines has a future import and a plausible possibility in light of which association of the mind with any given natural or fixed constitution becomes highly implausible and biased.

But why is the Turingian revolution in cognitive and computer sciences a revolution that is conceived in and takes place in the future? Because what Turing proposes is a schema or a general program for a thorough reconstruction and revision of what it means to be human and, by extension, humanity as a collective and historical constellation. Turing's underlying assumption is that the significance of the human can be functionally abstracted and computationally realized. This significance is the mind as a set of activities that span perception, thinking and intention—that is, the ability to turn sense data into perceptual impressions by mapping them to language as the domain of conceptual functions and then converting thoughts into intentional action.

The adequate functional abstraction and realization of this account of the human significance means that "what makes the human significant" can be realized by different individuating properties or realizers. But also what constitutes the human significance can be implemented in different modes of organization. The new context or environment of realization can then modify and update this functional schema drastically. In other words, the meaning of the mind will be changed in the course of its re-implementation in artifacts. Since implementation is not simply the relocation of a function or an abstract protocol from one supporting structure to another. It is the re-introduction of a (functional) role into a new context that will subsequently confer a new meaning to that role by providing it with different determining relations. To put it differently, implementation is the execution of a functional schema in a new context or environment with its specific sets of demands and purposes. Accordingly, re-implementation is the contextual repurposing and refashioning of a function that diversifies its content.

Realizing the mind through the artificial by swapping its natural constitution or biological organization with other material or even social organizations is a central aspect of the mind. Being artificial, or more precisely, expressing itself via the artifactual is the very meaning of the mind as that which has a history rather than an essential nature. Here the artificial expresses the practical elaboration of what it means to adapt to new purposes and ends without implying a violation of natural laws. To have a history is to have the possibility of being artificial—that is to say, expressing yourself not by way of what is naturally given to you but by way of what you yourself can make and organize. Denouncing this history is the same as rejecting freedom in all its forms. Denying the artificial truth of the mind and refusing to take this truth to its ultimate conclusions is to antagonize the *history* of the mind, and therefore, to be an enemy of thought.

The functionalist understanding of the mind is a historical moment in the functional evolution of the mind: In making sense of the mind in terms of its activities and their roles, the functional account gestures toward a mind constructed by different sets of realizers and in a different domain. Exploring the meaning of the mind coincides with artificially realizing it, and the artificial realization changes the very conditions by which this meaning used to be determined.

Once the real content of the human significance is functionally abstracted, realized and implemented outside of its natural habitat, the link between the structure in which this function is embedded and the significance qua function is weakened. Up to now, the influence of the structure (whether as a specific biological structure or a specific social stratum) over the function has been that of a constitution *determining* the behaviors or activities of the system. But with the abstraction and realization of those functions that distinguish the human—that is to say, by furnishing the real significance of the human with a functional autonomy—the link between the structure (or manifest humanity) and the function (all activities that make the human human) loses its determining power. The human significance qua a functional set of specific activities evolves in spite of conditions under which it has been naturally realized.

If the determining influence of the constituting structure (in this case, the specific biological substrate) over the function is sufficiently weakened, the image of the functional evolution can no longer be seen and recognized in the structure that supports it. The evolution at the level of function—here the expansion of the schema of the mind—is asymmetrical to the evolution of the structure, be it the evolution of the biological structure that once supported it or a new artificial habitat in which it is implemented. It is akin to a shadow that grows to the extent that it eclipses the body that once cast it.

In this fashion, what constituted or presently constitutes the human no longer determines the consequences of what it means to be human. Why? Because, the functional realization of “the meaning of being human” implies the departure of this meaning from the present condition or the image with which we identify the human. To put it differently, the function is able to reconstitute itself by perpetually reconstructing and revising itself, by evolving asymmetrically with regard to the structure and by revising its meaning through re-implementation in new substrates. By being re-implemented or introduced into a new context of realization, the function is able to change the overall schema of the mind. A project that in theory and practice articulates the possibility of realization and implementation of the human experience in machines is a project that concretely undermines what the human experience is and how it looks.

A program committed to the multiple realizability of the human mind can no longer be simply defined in terms of reflection on past and present conditions of the mind.[5] By attempting to realize the human mind in the machine, such a program realizes a mind that shatters the canonical picture of the mind we use to recognize ourselves, distinguishing ourselves from the machine we regard as inherently disabled. What the mind was and what it is, how it was originally realized and how it is presently constituted no longer bear any determining significance on the multiply realizable mind. Such a program genuinely belongs to the future, its present theoretic-practical dimension elaborates a discontinuity that we do not have the cognitive means to fathom.

The constructive and revisionary dimension of Turing's functional realization of the human cannot be seen from the perspective of the present because the implications of construction and revision as the forces of reconstitution and reconception unfold from the future. In short, what Turing does is to provide the blueprint of a program through which the consequences of being distinguished as human (or having human experience) are discontinuous and irreconcilable with what we currently identify as the human.

5 According to the multiple realizability thesis, the realization of a function can be satisfied by different sets of realizing properties, individuating powers and activities. Therefore, the function can be realized in different environments outside of its natural habitat by different realizers. Multiple realizability usually comes in strong and constrained varieties. The strong version does not impose any material-structural or organizational constraints on the realizability of a specific function, therefore the function is taken to be realizable in infinite ways or implementable in numerous substrates. The constrained variety, however, sees the conditions required for the realizability of a function through a deep or hierarchical model comprised of different explanatory-organizational levels and qualitatively different realizer properties which impose their respective constraints on the realization of the function. Accordingly, in the weak or constrained version of multiple realizability, the criteria for the realization of a function are characterized as *dimensionally varied* and *multiply constrained*. The function is then described as multiply realizable while multiply constrained. The constraints on the realization of function are dimensionally varied because they are determined by different organizational levels, which orchestrate or explain that function.

Turing's thesis on computational-functional realizability of the human mind is a thesis about constructability, its consequences take shape in the realm of manifest realization. It suggests there is no essentialist limit to the reconstructability of the human or "what human significance consists in." However, it goes even further by highlighting the consequence of constructing the mind outside of its natural habitat: *The reconstruction of the mind is tantamount to the reconstitution of its meaning*. It is in this sense that Turing's project marks a rupture in the truth of humanity, between the meaning of being human and its ramifications. In practice and through construction, it elaborates that to be human does not entail the understanding of the consequences of what it means to be human. Indeed, these two couldn't be further apart. To be human is neither a sufficient condition for *understanding* what is happening to the human by becoming part of a program that defines and elaborates the mind in computational-functional terms, nor is it a sufficient condition for *recognizing* what the human is becoming as the result of being part of this program. It can neither apprehend the consequences of revising the functional meaning of the human nor the scope of constructing the machine according to a computational-functional picture of the human mind.

By aiming at the realization of the human mind outside of its natural habitat, Turing draws a new link between emancipation (here the emancipation of human significance at the level of activities or functions) and the liberation of intelligence as a vector of self-realization. Turing's computationalist-functionalist project is significant because its ramifications—regardless of its current state and setbacks it has suffered—cannot be thought by its present implications. In this sense, by definition, humanity as we identify it in the present cannot grapple with and realize the scope of Turing's project.

In continuation of the project of the radical enlightenment, Turing's project is in fact a program for amplifying the imports of enlightened humanism insofar as it fully conforms to the following principle: The consequentiality or significance of the human is not in its given meaning or a conserved and already decided definition. Rather, it is in the ability to bootstrap complex abilities from primitive abilities. These complex abilities define what the human consists in. But insofar as they are algorithmically decomposable (cf. different types of computation for different functions, different kinds of algorithms for different activities and abilities), they present the definition of the human as amenable to modification, reconstruction, and implementation in artifacts. And this is the constructible hypothesis upon which Turing's project is founded: The significance of the human lies not in its uniqueness or in a special ontological status but in its functional decomposability and computational constructability through which the abilities of the human can be upgraded, its form transformed, its definition updated and even become susceptible to deletion.

Turing's computational project contributes to the project of enlightened humanism by dethroning the human and ejecting it from the center while acknowledging the significance of the human in functionalist terms. For what is the expandable domain of computers if not the strongest assault upon the ratiocentricity of the human mind in favor of a view that the ratiocinating capacities of the human mind can be reconstructed and upgraded in the guise of machines?

It is the understanding of the meaning of the human in functional terms that is a blueprint for the reconstruction of the human and the functional evolution of its significance beyond its present image. The knowledge of the mind as a functional item develops into the exploration of possibilities of its reconstruction. While the exploration of functional realization by different realizers and for different purposes shapes the history of the mind as that which has no nature but only possibilities of multiple realization and their corresponding histories.

What used to be called the human has now evolved beyond recognition. Narcissus can no longer see or anticipate his own image in the mirror. The recognition of the blank mirror is the sign that we have finally left our narcissistic phase behind. Indeed, we are undergoing a stage in which if humanity looks into the mirror it only sees an empty surface gawking back.

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