

Get the Latest Upgrade: Functionalism 6.3.1

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Résumé : Le fonctionnalisme est une solution populaire au problème esprit–corps. Il a un certain nombre de versions. Nous en exposons certaines parmi les principales, en énumérant une partie de leurs caractéristiques les plus importantes ainsi que certains « *bugs* » qui les ont entachées. Nous présentons comment les différentes variantes sont liées. Nombreux ont été les pessimistes à propos des perspectives du fonctionnalisme, mais la plupart des critiques ne tiennent pas compte des dernières mises à jour. Nous finissons en suggérant une variante du fonctionnalisme qui fournit une description complète de l'esprit.

Abstract: Functionalism is a popular solution to the mind–body problem. It has a number of versions. We outline some of the major releases of functionalism, listing some of their important features as well as some of the bugs that plagued these releases. We outline how different versions are related. Many have been pessimistic about functionalism's prospects, but most criticisms have missed the latest upgrades. We end by suggesting a version of functionalism that provides a complete account of the mind.

The mind–body problem is the problem of how the mental relates to the physical. We know they are intimately involved: the physical affects the mental when our body is injured and we feel pain, or when we drink alcohol and feel intoxicated; the mental affects the physical when we decide to retrieve a book and reach for it, or when we perceive the signal to cross the street and begin walking. The first solution that comes to mind is dualism: the view that the mental and physical are two different kinds of thing. While dualism is intuitively appealing, it faces such serious difficulties (how to account for the intimate connections between the mental and the physical, how the mental and the physical could possibly interact, etc.) that it's been mostly abandoned. The other option is monism, according to which the mental and the physical

are the same. What might seem like two things (or two kinds of thing) are actually only one. The unpopular version of monism is idealism, which holds that the mental is real and the physical is to be explained in terms of the mental. The popular version of monism is physicalism, which holds that the physical is real and the mental is to be explained in physical terms.

Bare physicalism does not completely solve the mind–brain problem: we must still account for the precise nature of mental states. Behaviorists hold that mental states are dispositions to behave in certain ways, but behaviorism is another view that has been mostly abandoned because, among other reasons, it has a hard time accounting for occurrent mental states such as conscious feelings. Type identity theorists hold that mental state types are just physical state types; for instance, beliefs are a certain type of physical state, and desires are another. Token identity theorists hold that each individual mental state is just an individual physical state, but mental types need not correspond to any physical type. Type identity and token identity are helpful in grounding the mental in the physical. But they do not explain the interestingly *mental* aspects of those physical states (or state types) as opposed to other physical states (or state types).

Functionalism is a popular option for explaining the uniquely mental aspects of the mind. What makes a state mental is its function, usually understood to be a relationship between inputs, outputs, and other functional states. Functionalism thus allows us to explain certain states as playing a role in the mind, while being consistent with physicalism.

Throughout the history of functionalism, many versions of functionalism have been offered, with new features added, and certain bugs fixed. We provide here an overview of the major releases of functionalism—a sketch of its version history. We will list different versions of functionalism from its beta version through its first release and subsequent upgrades. In the end we offer a final upgrade: Functionalism 6.3.1.

1 Functionalism beta version

The beta version of functionalism is simply the view that mental states are functional states [Putnam 1967]. Functional states, according to Functionalism beta, are states of a system individuated by (some of) their causal relations to inputs, outputs, and other functional states. Thus, the picture of the mind painted by Functionalism beta is the picture of a system that receives sensory inputs, manipulates the inputs via a complex network of causally interconnected functional states (i.e., mental states), and then produces behavioral outputs.

Functionalism beta stands in contrast to dualism, according to which mental states are non-physical states. Thus Functionalism beta avoids the notorious pitfalls of dualism, including dualism’s inability to do justice to mental causation. (But see Functionalism 1.1 below for an important caveat

about functionalism vs. dualism.) Functionalism beta also stands in contrast to input-output (or metaphysical) behaviorism, according to which mental states are nothing more than behavioral dispositions. Thus Functionalism beta avoids the notorious pitfalls of input-output behaviorism, including its inability to make sense of occurrent mental states (such as occurrent sensations and thoughts).

Despite these features, the beta version of functionalism lacks too many features to be a viable software package: What, exactly, are functional states? Are they physically realized? Are functional types identical to physical types? Functional states are individuated by their causal relations, but which causal relations? Presumably not all of them, but then how are the relevant causal relations picked out?

Functionalism 1.0

Functionalism 1.0, the first working release, includes the feature that functional states are specified by a folk psychological theory [Lewis 1972]. Folk psychology specifies a number of platitudes about the mind. For example: people generally avoid doing things that cause them pain; or people generally try to achieve what they desire. According to Functionalism 1.0, the conjunction of all such folk psychological platitudes constitutes a theory [Lewis 1970]. The terms of the theory refer to the functional states that correspond to mental states. The relations specified by the platitudes between the functional states, their inputs, and their outputs are the causal relations that individuate the functional states.

Functionalism 1.0 turned out to have a series of bugs: it is doubtful that there really is a suitable body of folk psychological platitudes about the mind; if there were such a body, it is doubtful that it would constitute a theory in the relevant sense; if it did constitute such a theory, it is doubtful that it would be correct or precise enough to pick out people's (or animals') actual mental states. Because of these bugs, Functionalism 1.0 never ran successfully.

Functionalism 1.0.1 replaces folk psychological theory with analytic truths about the mind [Shoemaker 1981]. But Functionalism 1.0.1 never compiled correctly because no one could find a suitable list of analytic truths about the mind, so the project was abandoned.

Functionalism 1.1

Functionalism 1.1 avoids the bugs that plagued Functionalism 1.0 by replacing folk psychological "theory" with scientific psychological theory [Fodor 1968a]. The functional states are picked out by psychological laws, or perhaps psychological generalizations, to be discovered empirically by experimental psychologists.

So far so good. But we still don't know whether and how functional states are physically realized. Some early proponents of functionalism went out of their way to point out that functional states *need not* be physically realized. They may be states of a non-physical substance [Putnam 1967]. If so, then functionalism is consistent with dualism, with all its mysteriousness and notorious problems. Something had to be done.

Functionalism 2.0

Functionalism 2.0 attempts to solve the realization problem that plagued earlier versions by including the feature that functional states are type-identical to physical states. In other words, each type of functional state is identical to a type of physical state [Armstrong 1968], [Lewis 1966], [Lewis 1972]. Thus, Functionalism 2.0 is consistent with the type-identity theory of mind: mental state types are physical state types [Place 1956], [Smart 1959].

A new bug arises with Functionalism 2.0: multiple realizability. Mental states appear to be multiply realized. For example, pain appears to be realizable in physically different neural (or even non-neural) systems. And functional states appear to be multiply realized by different physical types; a smoke detector in a smoke alarm can be made with an optical sensor or one that uses ionizing radiation. Hence, functional types do not appear to be the same as physical types, because functional types can be multiply realized, whereas physical types allegedly cannot.

Functionalism 2.1

Functionalism 2.1 fixes the multiple realizability bug by replacing token identity for type identity. According to Functionalism 2.1, functional states are realized by, but not identical to, physical states. What this comes down to is that each token of a functional state type is identical to a token of a physical state type, but different tokens of the same functional state type may be realized by tokens of different physical state types. Thus Functionalism 2.1 entails token physicalism: each token of a functional state is realized by a token of a physical state (cf. [Fodor 1974], building on the token identity theory proposed in [Davidson 1970]).

Multiple realizability raises the question of what realization is. Two main answers have been given. Functionalism 2.1.1 conjoins multiple realization with the so-called “flat” view of realization: when property *P* realizes property *M*, both *P* and *M* belong to the same individual [Kim 1998], [Shapiro 2000], [Shoemaker 2001]. So, for example, an object is a corkscrew because it can remove corks, and the properties of that physical object that realize its ability to remove corks include its hardness, its ability to apply a force via a lever, and so on. A second object might also be a corkscrew because it also

has the capacity to remove corks, but the properties that allow it to do so may be quite different than those of the first.

This picture has been challenged by the so-called “dimensioned view” of realization [Aizawa & Gillett 2009], [Gillett 2003]. On this view, realization is a relation between a property M belonging to a system and a set of properties P_1, \dots, P_n belonging to the system’s parts. For example, the hardness of a diamond is realized by the properties of its carbon atoms. The conjunction of Functionalism 2.1 and the “dimensioned view” of realization gives rise to Functionalism 2.1.2.

Functionalism 3.0

Previous versions of functionalism asserted that the functional relations between inputs, outputs, and mental states are specified by a theory. After Functionalism 1.1, such a theory is a scientific psychological theory. What kind of scientific theory? How does such a theory specify the functional relations? Functionalism 3.0 adds that the theory is computational. Specifically, the functional relations are computational relations specifiable by a Turing machine table [Putnam 1967]. As a consequence, according to Functionalism 3.0, mental states turn out to be Turing machine table states.

One problem with Functionalism 3.0 is that a Turing machine is in one and only one state at a time, whereas minds appear to possess more than one mental state at a time. In addition, cognitive scientists never used Turing machine tables to formulate computational theories of cognition [Sloman 2001]. What they did use is computational models of various kinds. So while Functionalism 3.0 ran, nobody wanted to use it.

Functionalism 3.1

To address the shortcomings of Functionalism 3.0, Functionalism 3.1 replaces Turing machine tables with a computational psychological theory. The functional relations between inputs, outputs, and mental states are computational relations specified by the computational theory [Block & Fodor 1972]. Mental states are thus computational states.

Functionalism 3.2

Functionalism 3.1 says psychological explanation is computational but doesn’t articulate how computational explanation is supposed to work. Functionalism 3.2 remedies this bug by adding that psychological explanation is functional analysis [Cummins 1975], [Fodor 1968a].

Functional analysis, in turn, comes in three flavors. One flavor is simply the analysis of a system and its capacities in terms of the functional relations

between its inputs, outputs, and internal states [Fodor 1968b]. Another flavor adds that the internal states are contained in functionally defined components or black boxes, which reside inside the system [Fodor 1983]. A third flavor says that functional analysis is the analysis of a system's capacities in terms of that same system's subcapacities; the functions of these subcapacities are nothing more than the contributions they provide to the capacities of the system [Cummins 1983].

Although functional analysis applies to both computational and non-computational systems, users of Functionalism 3.2 typically also maintain that minds are both functional and computational. According to Functionalism 3.2, then, the mind is a functional system to be functionally analyzed. The analysis is carried out by a computational theory that specifies the computational relations between inputs, outputs, and mental states.

Functionalism 3.3

Functionalism 3.3 adds the feature that the functions of the subcapacities or components of the mind, in whose terms the functional analysis is carried out, are teleological functions [Lycan 1981], [Millikan 1989], [Sober 1984]. Functionalism 3.3 comes in a number of variants, which makes things a bit confusing. Teleological functions may be characterized in evolutionary terms, as adaptations, but they need not be. Some supporters of Functionalism 3.3 maintain that once teleological functions are added, computational relations may be dropped [Sober 1984]. But this is by no means a necessary aspect of Functionalism 3.3. For present purposes, all that matters is that, according to Functionalism 3.3, the mind is a functional system functionally analyzed in terms of the teleological functions of its components.

Functionalism 3.4

Functionalism 3.4 further enriches the account of psychological explanation that grounds functionalism. Instead of functional analysis, Functionalism 3.4 maintains that psychological explanation is mechanistic, that is, it is a decomposition of a system in terms of its components, their functional activities, and their organization [Bechtel & Richardson 2010], [Craver 2001], [Machamer, Darden & Craver 2000], [Piccinini & Craver 2011].

According to Functionalism 3.4, the mind remains a functional system, but a mechanistic one [Piccinini 2010]. The states and capacities of the system still have functions, which may be cashed out either in terms of the contributions they provide to the system [Craver 2001] or in teleological terms. If teleological, the functions may be characterized either etiologically or non-etiotologically.

Functionalism 4.0

Mental states appear to have intentionality: one's belief that the sun is a star is *about* the sun. So far, functionalism has had nothing to say about this. Functionalism 4.0 combines functionalism with representationalism—the view that mental states represent. But what kinds of representation are mental states? Functionalism 4.0 was never released on its own, but came in a variety of versions, each answering this question in its own way.

Functionalism 4.1

One idea for how mental states might represent comes from a close analogy with language. Language is *productive*: starting with some basic elements, an infinite number of sentences can be constructed in structured ways. Similarly, language is *systematic*: if a person can utter the sentence “Sheldon chased Leonard” then she can also utter the sentence “Leonard chased Sheldon”. Thought seems to have these same features, suggesting a natural parallel between the structure of language and the structure of thought. This is the essence of the language of thought (LOT) hypothesis [Fodor 1975], [Harman 1973], [Sellars 1963].

Functionalism 4.2

Connectionism is one putative alternative to LOT.¹ Inspired by early work on perceptrons in artificial intelligence, connectionism views the mind as a multi-layered neural network. Mental representations, then, are vectors of activation within the network, established by the particular pattern of connection strengths between the nodes of the network. This pattern of connection strengths is sometimes explicitly provided to the network, but much more often it is the result of learning and training [Rumelhart, McClelland & PDP Research Group 1986].

While proponents of LOT have argued that connectionism lacks the resources to explain the systematicity and productivity of thought [Fodor & Pylyshyn 1988], connectionists have argued that their view of the mind is more “brain-like”, and thus a better candidate for how the mind actually works. Additionally, connectionist systems have built-in properties that LOT-based systems lack, such as the ability to learn in supervised and unsupervised ways, and the ability to degrade gracefully in the presence of damage.

1. Whether connectionism and LOT stand in genuine opposition to one another depends on how they are defined more precisely. Cf. [Piccinini & Scarantino 2011, Section 3.4] for more details.

Functionalism 4.3

If a system's being "brain-like" is a virtue, one can go further than connectionism. The kind of artificial neural networks employed by connectionist modelers did not resemble neural systems in any very detailed way; rather, they were loosely inspired by neural systems, with nodes and connections that resemble highly simplified and idealized neurons. In other words, the artificial neural networks employed by connectionists did not (and were never meant to) model how actual *neural* processes work, but how *cognitive* processes could be implemented in a system of distributed nodes in a network.

Functionalism 4.3 takes off where connectionism leaves off: rather than mental representations as vectors of activation in an artificial neural network, this version takes mental representations to be vectors of activation in *real* neural networks. This could be called neural representation. The view that mental representation is neural is one foundational tenet of cognitive neuroscience [Churchland 1989], [O'Reilly & Munakata 2000], [Vendler 1972].

Functionalism 5.0

Explaining intentionality requires more than an account of the format of mental representations. It also requires a naturalistic account of the semantic relation between mental representations and what they represent, i.e., a psychosemantics. Functionalism 5.0 adds to previous versions of functionalism such a naturalistic semantics.

As a first pass at a naturalistic semantics, Functionalism 5.0 is an internalist, or methodologically solipsist [Fodor 1980], theory. It attempts to give a semantics for mental states without leaving the boundaries of the head, that is, solely in terms of the relations between proximal inputs (such as retinal stimulations), proximal outputs (such as motor commands), and internal states. Sometimes this view is expressed by distinguishing between broad and narrow content. Narrow content is semantic content that is contained solely within the head [Segal 2000]. Because Functionalism 5.0 accounts for the semantic content of mental representations in terms of functional roles that are confined within the head, it is also called short-arm functionalism.

But meanings "ain't in the head" [Putnam 1975], or so many people argue. According to the popular externalist view about semantic content, semantic content depends on relationships between mental states and things outside the head. In fact, it has proven difficult to give an account of mental content that does not include the relationship between mental representations and things external to the system (in the system's environment). Including such a relationship leads to long-arm functionalism, of which there are several variants depending on how that relationship is construed.

Functionalism 5.1

The oldest form of psychosemantics is functional role semantics, which accounts for semantic content in terms of functional relationships between environmental stimuli, internal states, and actions [Sellars 1954]. It is quite a natural step to combine functional role semantics with functionalism [Block 1986], [Field 1978], [Harman 1973, 1999], [Loar 1981].² After all, if mental states just *are* functional states, the thesis that these states get their content by way of their functional role within a cognitive system is explanatorily parsimonious.

Functionalism 5.2

The second oldest form of psychosemantics is deflationism about mental content. One version of deflationism is instrumentalism about mental content, according to which mental content is just a convenient way to predict behavior [Dennett 1969, 1971, 1987]. According to this version, pragmatic concerns might invite, or even require, that we attribute mental contents (and attendant propositional attitudes) to cognitive systems. But this attribution is nothing more than that—an attribution—that is not in need of theoretical explanation.

A related view is eliminativism about mental content, according to which mental content has no role to play within a science of the mind [Stich 1983]. Functionalism 5.2.1 sees mental content as a superfluous feature that earlier users only *thought* was important. All of the real work provided by a scientific account of mentality will have no use for (and couldn't have a use for) mental content. The correct account of the mental will be specified only in syntactic terms, and as such, the individuation of mental states need not appeal to semantics.

Functionalism 5.3

A third family of psychosemantic theories accounts for the semantic relation between mental states and what they represent in terms of some combination of information, teleology, and control. Briefly, a mental state has its content in virtue of some combination of the natural information it carries [Dretske 1981, 1988] and its teleological function [Millikan 1984, 1993], which may include the way it is used by the brain to drive behavior.

Functionalism 6.0

There is still a major hole in functionalism: the lack of an account of phenomenal consciousness. Why should any functional system be conscious? It was

2. Some versions of functional role semantics are more internalist, others more externalist. Cf. [Harman 1999] for more details.

pointed out quite early that, *prima facie*, a system that is functionally equivalent to a human mind need not have any phenomenally conscious mental states [Block 1978], [Block & Fodor 1972]. Functionalism 6.0 attempts to remedy this by simply reasserting that some combination of functional relations is enough to explain consciousness, perhaps in combination with a deflationary view of what phenomenal consciousness amounts to [Dennett 1988, 1991], [Lycaen 1987].

Functionalism 6.1

A related way to account for phenomenal consciousness is representationalism about consciousness, according to which phenomenal consciousness is just a representational feature of mental states [Harman 1990]. Rather than an intrinsic feature of experience itself, consciousness is a feature of *representations* of experience: making this distinction allows for Functionalism 6.1 to accommodate phenomenal consciousness.

Functionalism 6.2

A third way to account for phenomenal consciousness is property dualism, according to which phenomenal consciousness is due to non-physical, non-functional properties of mental states. This view may be conjoined with functionalism about non-phenomenally conscious aspects of mental states [Chalmers 1996].

Functionalism 6.3

A final way to save functionalism is to conjoin it with a type identity theory of consciousness. Roughly, although many aspects of mental states are multiply realizable and thus may be accounted for in terms of the functional relations between inputs and other mental states, the phenomenally conscious aspect of mental states must be accounted for in a different way, namely, as some physical aspect of the mind's realizers [Block 2006], [Polger 2004].

A related view of consciousness is that properties are both qualities and powers, and it is their qualitative aspect—as opposed to their powers—that accounts for phenomenal consciousness [Heil 2003, 2012], [Martin 2007]. By the same token, it may be held that functional states have a qualitative aspect, and in the case of states with appropriate functional roles this qualitative aspect amounts to their phenomenally conscious status. We are not aware of anyone who has combined the view that properties are powerful qualities with functionalism, but we see no reason why it cannot be. The result is Functionalism 6.3.1: Functional states have qualities, and it is those qualities that account for the phenomenally conscious aspects of some mental states.

Conclusion: get the latest upgrade

Having tested all versions of functionalism, we recommend that you get yourself basic functionalism plus mechanisms plus neural representations and computations plus naturalistic semantics based on information and control plus properties that are powerful qualities. You'll have a complete account of the mind. Mental states are representational functional states within the appropriate kind of computational mechanistic system. Some mental states even have a qualitative feel.

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