



Functionalism and structuralism in biology: stances or explanatory strategies?

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Abstract

Functionalism in biology is the view that with respect to organic form, structure is explained in terms of function, and structuralism is the view that structure is explained independently of function. Recent work on the topic has focused on ‘meta-level’ question such as, how should functionalism and structuralism be understood? What sort of positions are they? How if at all can they be justified? And what role do they play in biology? I have argued (Boucher 2015) that they should be understood as philosophical stances *sensu* van Fraassen (2002): clusters of attitudes, values, goals and commitments, rather than factual beliefs. In making this case I adapt van Fraassen’s argument for treating materialism as a stance in this sense. In both cases, I suggest, only the stance interpretation can do justice to the manifest historical continuity of these views, and the fact that they have persisted through revolutionary changes in theory. In her recent book (2023), Rose Novick offers a critique of my view, and suggests that functionalism and structuralism should be construed rather as explanatory strategies. This can, she claims, capture the historical continuity of the views, while also having the virtue of showing how function-structure disputes can be empirically decided, something the stance account struggles with. In this paper I defend my view against Novick’s critique, while extending and developing it. I argue that Novick’s conception of explanatory strategies is too minimalist to capture the forms of functionalist and structuralist reasoning in question, and propose an expanded, richer and, I claim, more adequate explanatory schema for functionalism and structuralism that builds in value judgments characteristic of stances. And I respond to Novick’s normative claim that even if functionalism and structuralism have in fact taken the form of stances, it would be better for biology if such stances did not exist.

Keywords Functionalism · Structuralism · Adaptationism · Stances · Explanatory strategies

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1 Introduction

To a first approximation, functionalism in biology is the view that in the natural world, function is, for the most part, prior to structure; structuralism is the view that, for the most part, structure is prior to function. More precisely, functionalism is the view that with respect to organic form, structure is explained in terms of function, and structuralism is the view that structure is explained independently of function. Functionalism-structuralism disputes have a long history, arguably going back at least to Aristotle, an early functionalist (Russell, 1916; Gould, 2002; Grene & Depew, 2004; Appel, 1987); they were fought out in the early modern (pre-Darwinian) period with thinkers such as Cuvier and Paley defending versions of functionalism and their opponents such as Geoffroy defending versions of structuralism; and they have continued to be prominent since Darwin, with neo-Darwinians such as Dobzhansky and Dawkins (and of course Darwin himself) carrying on the functionalist tradition, opposed by contemporary structuralists such as Goldschmidt, Gould and Goodwin.

Recent philosophical work on the topic has focused less on the question of which side is correct, and more on ‘meta-level’ questions such as, how should functionalism and structuralism be understood?¹ What sort of positions are they? Beliefs? Theories? Paradigms? Explanatory strategies? Philosophical stances? Or some combination of these? How are they justified? And what role to they play in biology? In my (2015), I argue that they should be understood as philosophical stances *sensu* Van Fraassen (2002). In her recent book (2023), Rose Novick offers a critique of my view, and suggests that they should be construed rather as explanatory strategies. In this paper I defend my view against Novick while extending and developing it. I shall proceed as follows. In section 2 I shall summarise my arguments for treating functionalism and structuralism as stances. In section 3 I shall spell out Novick’s explanatory-strategy view. In section 4 I shall argue that, *contra* Novick, there may be defensible global forms of even empirical functionalist and structuralist views. In section 5 I shall argue that Novick’s conception of explanatory strategies is too minimalist to capture the forms of functionalist and structuralist reasoning in question, and propose an expanded, richer and, I claim, more adequate explanatory schema that builds in value judgments characteristic of stances. In section 6 I respond to Novick’s normative claim that even if functionalism and structuralism have in fact taken the form of stances, it would be better for biology if such stances did not exist. The focus here will be on Novick’s claim that it is when stances embody *judgements of importance* that they become particularly problematic. And in section 7 I consider the significance of Novick’s admission that her explanatory-strategy view is itself an expression of a higher-level philosophical stance.

An important point to keep in mind throughout is that although functionalism and structuralism are, as I and Novick both argue, *philosophical* positions within biology that have survived changes in theory, they are, at the end of the day, part of biology: they are views about the *natural world*. They are not general, abstract logical or metaphysical claims about the nature of and relation between function and structure anywhere and everywhere. It is likely, as we shall see, that they are more abstract,

¹ Though of course the two questions are related.

general and philosophical than *specific* theories within biology, or *specific* theories of biological function and structure, but they are still views concerning the *biological* domain, and must be assessed on the basis of how well they make sense of and help us explain the nature of that domain: they are not purely ‘logical’ categories.²

2 Functionalism and structuralism as stances

I have argued (Boucher, 2015) that functionalism and structuralism in biology should be understood as philosophical stances in van Fraassen’s sense: clusters of attitudes, values, goals and commitments, rather than factual beliefs.

‘A philosophical position can consist in something other than a belief in what the world is like. The alternative is a stance (attitude, commitment, approach) which can be expressed, and which may involve or presuppose some beliefs as well, but not ones that are unpalatable to someone taking that stance ... What empiricists have shared over the centuries ... has not most obviously been a set of beliefs ... [empiricism is] an attitude, or rather a cluster of attitudes, a philosophical stance’ (Van Fraassen, 1995, 86, 83).

To make the case for the claim that functionalism and structuralism are stances in this sense, I adapt van Fraassen’s argument for interpreting materialism as a stance. Materialism possesses a lineage that has persisted across the centuries through multiple revisions in the understanding of the physical world given to us by science; hence it does not appear to be tied to any particular conception of ‘the physical’, or to any particular physical ontology. Thus it doesn’t seem to involve any particular *belief* about the world and what it’s like; it is, rather, a stance or attitude:

I propose the following diagnosis of materialism: it is not identifiable with a theory about what there is but only with an attitude or cluster of attitudes. These attitudes include strong deference to the current content of science in matters of opinion about what there is. They include also an inclination (and perhaps a commitment, at least an intention) to accept (approximative) completeness claims for science as actually constituted at any given time (Van Fraassen, 2002, 59).

Similarly, as noted above, functionalism and structuralism have persisted across the centuries; in particular, there are pre-Darwinian and Darwinian functionalists and structuralists. Most would accept that it makes sense to group Dobzhansky and Cuvier together as functionalists despite the fact that the former is an evolutionist and the latter a creationist.³ I argue that as with materialism, this makes it hard to see how

²Thanks to an anonymous reviewer for urging me to clarify this point.

³An additional, possibly even more important, difference between Dobzhansky and Cuvier with respect to the nature of their functionalist commitments was that they had different approaches to and understandings of function itself, with Cuvier focusing on physiological function and Dobzhansky on adaptation

these views could be identified with any particular belief about the world. We should rather think of them as van Fraassian stances: To adopt such a stance is to: ‘approach the natural world in a certain way, from a certain perspective, with a tendency to focus on, emphasise, and find meaning and significance in certain features, and de-emphasise others ...’ (Boucher, 2015, 391).

3 Novick: Functionalism and structuralism as explanatory strategies

Novick (2023) argues functionalism and structuralism are best construed as *explanatory strategies*.⁴ She considers two alternative accounts: functionalism and structuralism as stances (Boucher, 2015), and as Kuhnian paradigms (Winther, 2015). The stance view can capture historical continuity, she claims, but struggles to capture the ways that function-structure disputes can be empirically decided, and the research strategies pursued by scientists. ‘Precisely because stances have a loose, nonlogical relationship with theories and evidence, Boucher’s account says little about what types of evidence functionalists (structuralists) will gather, what kinds of theories they will develop on that basis, what kinds of explanations they will favor, and how they will conduct empirical disputes’ (Novick *ibid*, 5).

The paradigm view on the other hand can capture these features better than the stance view, but struggles to capture historical continuity. Kuhnian paradigms do not persist across theory-change the way stances do, so the paradigm-construal can’t make sense of functionalism and structuralism as persisting intellectual lineages that predate the Darwinian revolution (*ibid*, 6).

But all of these are important desiderata of an account. The explanatory strategy account can satisfy them all, Novick argues. As a view intermediate between the stance view and the paradigm, view, it is concrete enough to explain biologists’ research practices and priorities, and abstract enough to capture historical continuity across radical theory-change. Pre-Darwinian and Darwinian functionalists (structuralists) can be understood as pursuing roughly the same explanatory strategies. Yet explanatory strategies specify research agendas and programs of empirical inquiry in a way that value-laden stances do not (*ibid*, 6–7).

An explanatory strategy, for Novick, specifies *explanandum* and *explanans*. For the functionalist, the explanandum is organic form. The explanans can be specified in abstract terms independent of theory: ‘Functional needs determine form’. Concrete explanations for form can then be generated by ‘specifying the causal link between function and form’, and different functionalist theories are characterised by the different causal links they posit:

Functionalist explanatory strategy (*ibid*, 18):

(evolutionary function). This supports the general point I am making about thinkers who share a stance despite differing in their beliefs, theories, accounts of the nature of function and so on. Thanks to an anonymous reviewer for suggesting this point to me.

⁴More precisely, she accepts that as a descriptive claim, the stance view is partly correct: functionalism and structuralism have indeed at times taken the form of stances. But she rejects it is a normative claim: functionalism and structuralism *should not be* stances. See section 6 for discussion.

- Explanandum: *form*
- Explanans:
 - Abstract: *Functional needs determine form*
 - Concrete (generated by specifying the causal link between function and form):
 - Divine creator considers species needs (Paley)
 - Environmental changes generate functional variants (Lamarck, Jablonka)
 - Natural selection favours functional variants (Darwin, Dobzhansky)

Strong global claims – e.g. ‘in every case only functionalist explanatory strategies are needed’ – are, Novick claims, very implausible, and indeed have rarely if ever been explicitly defended. Everyone does and should accept that sometimes functionalist explanations are legitimate, and sometimes structuralist ones are. More reasonable are *subordination arguments* (SAs), e.g. structuralist explanations are legitimate but are subordinate to functionalist explanations (*ibid*, 40–47). An example of a functionalist subordination argument (FSA) is Darwin’s subsumption of unity of type under the principle of conditions of existence. Unity of type – structural correspondences found across widely varying taxa – is a real phenomenon, he concedes, but since these features exist because they were adaptive and thus favoured by selection in the past (and subsequently inherited), the structuralist principle of unity of type is ultimately explained in terms of, and is hence subordinate to, the functionalist principles of selection and adaptation (*ibid*, 41). An example of a structuralist subordination argument (SSA) is Owen’s claim that while *modifications* of the archetypal form of the ideal vertebrate (to produce fish, birds, mammals etc.) may have functionalist explanations, the nature of that archetypal form itself could not be explained in functional terms, meaning that the functional modifications were in an important sense secondary and subordinate to the structuralist explanation of archetypal form (*ibid*, 42).

However subordination claims themselves come in global and local forms. A global subordination claim would be that in every case or across all domains structuralist explanations are subordinate to functionalist ones.⁵ A local subordination claim would be that in a particular case or for a particular domain they are subordinate. Owen’s SSA mentioned above is a limited (local) claim as it pertains only to vertebrate form. If it was generalised to all organic forms, it would be a global SSA.

Novick suggests that global subordination arguments all fail. She argues that for each global SA, the putatively subordinated functionalist or structuralist factors are not in fact subordinate at all, but just as central and important as the putatively dominant functionalist or structuralist factors, making integration rather than subordination the appropriate strategy in each case (*ibid*, 47–49). More than this, she offers quite general reasons for supposing that global subordination arguments are bound to fail, including the fact that the course of evolutionary history is contingent: ‘*There is no one way that evolution occurs, common to all life*. As these differences may affect

⁵ Novick says that by ‘domain’ she means kinds of organisms (*ibid*, 46). I will use it in a somewhat broader way to include particular processes (e.g. macroevolution, microevolution) as well as kinds of organisms. My use is perhaps closer to ‘context’. Chang (Chang, 2022, 147) adopts a similar usage.

the relative importance of structuralist or functionalist explanatory strategies, there is no reason to expect either strategy to be universally dominant' (*ibid*, 50).

Local subordination arguments may often be compelling however.

Restricted subordination arguments may succeed, provided they satisfy the relevant success conditions. However, this will not yield a version of evolutionary theory that is either structuralist or functionalist *on the whole*. Rather, structuralist explanations will dominate for some phenomena in some domains, functionalist explanations for other phenomena in other domains, and integrative explanations still elsewhere. Considered as a whole, evolutionary theory can only be understood as integrative (*ibid*, 52).⁶

4 Empirical functionalism and structuralism

The upshot of Novick's argument that only local subordination claims are justified is that there is no place for functionalism or structuralism as general, global views about the natural world. In this section I shall argue that even when functionalism and structuralism are understood as empirical positions, and even granting some of Novick's assumptions, this claim is premature. In the following sections I take up her arguments about stances.

Let us accept that Novick has shown firstly that global SAs are bound to fail, and secondly that local SAs may sometimes succeed. Does it follow that there can be no defensible version of evolutionary theory that is, in general, functionalist or structuralist? And does it follow that, in relation to empirical subordination arguments, one could have no grounds for being a functionalist or a structuralist in general? I would suggest the answer to both is 'no'. For Novick has neglected the possibility that in a *majority of* cases, that is, in a *majority of* domains, (local) functionalist (structuralist) SAs are successful, and that this could ground a commitment to functionalism (structuralism). It seems perfectly possible that we should obtain evidence that, while 'structuralist explanations ... dominate for some phenomena in some domains, and functionalist explanations for other phenomena in other domains' (*ibid*, 52), functionalist (structuralist) explanations dominate in *more* domains than structuralist (functionalist) explanations, and that this would be sufficient to ground a commitment to empirical functionalism (structuralism), albeit it of a relatively moderate sort.⁷

If this be thought too moderate to be worthy of the name, consider an analogy. In the debate between punctuated equilibrium (PE) and gradualism, it has long been

⁶ See Brown (2023) for a similar analysis of the relation between functionalism as embodied in standard neo-Darwinian evolutionary biology and structuralism of the sort exemplified by evolutionary developmental biology (evo-devo), and implications for debates around the so called Extended Evolutionary Synthesis (EES). While these approaches do often conflict, she argues, they are also, in certain contexts, potentially complementary, or at least commensurable, echoing Novick's plea for integration to replace opposition where possible.

⁷ The functionalism-structuralism controversy as an empirical issue can, that is, be understood as a *relative frequency* dispute; see Beatty (1997), Kovaka and Novick (2024), Kovaka (2021), and Lloyd and Gould (1993).

understood that global claims to the effect that *all* lineages instantiate either the punctuational or the gradualist pattern, fail. Both sides in the debate (at least since PE was proposed) do (or should) accept that sometimes evolution proceeds in the gradualist mode, and sometimes in the punctuational mode. Does it follow that, to paraphrase Novick, there can be no defensible theory of long-term evolutionary trends that is punctuationist or gradualist on the whole, or that there can be no grounds for being a punctuationist or gradualist in general? No, since we can, and should, understand PE (gradualism) as the view that in the *majority* of cases the punctuational (gradualist) pattern prevails. Gould tells us:

As its primary claim, therefore, punctuated equilibrium must assert a dominant role for stasis within species and rapid cladogenesis between species in the construction of macroevolutionary patterns at the appropriate scale of speciation and trends across species within clades. This assertion requires that punctuated equilibrium maintain a *dominant relative frequency* in the origin of new paleo-species. Tests of the theory must therefore focus upon percentages of occurrence in exhaustive, or at least statistically definitive, surveys of particular taxa, faunas and times (Gould, 2002, 854).

We can render the analogy more exact by understanding PE and gradualism as offering subordination arguments. After all, many (perhaps most) lineages are likely to exhibit both gradualist and punctuational features: periods of gradual evolution and periods of stasis, for instance. There will thus be a spectrum from a ‘pure’ punctuational pattern to a ‘pure’ gradualist one – not surprisingly, since the tempo of evolutionary change is clearly a matter of degree – with most lineages occupying a position somewhere in between these extremes. The assertion that a lineage L fits the punctuationist model will be the assertion that *for the most part* L exhibits the punctuationist pattern, i.e. that while it displays some gradualist features these are *subordinate* (in a somewhat different sense, to be sure, from Novick’s use of this term) to its punctuational features, with the latter being *dominant* for the history of L. For instance, Kelley’s study of Miocene mollusc lineages found periods of gradual directional change in some lineages, but such changes tended to be either later reversed, or to run counter to the overall direction of change as measured from ancestral species to descendant (Kelley, 1983, 1984). There were gradualist episodes, in other words, but they were clearly subordinate to the predominant punctuational pattern in the lineages, and such relatively minor fluctuations could not account for the observed long-term macroevolutionary trends in the relevant clades.⁸

PE becomes then the claim that in the great majority of lineages, the punctuational pattern is dominant, and to the extent that the lineage displays gradualist features, these are subordinate to its punctuational features (and to be a punctuationist is to believe that PE, so defined, is true). Similarly functionalism can be understood as

⁸ Gould suggests that the punctuational pattern will be dominant, and the gradual directional change subordinate, when the accumulated anagenetic change throughout the lifetime of a species, to the extent that there is any, is insufficient to account for the average phenotypic difference between the ancestral and descendent species (2002, 767).

the view that in the majority of domains and contexts, structuralist explanations are subordinate to functionalist ones, and to be an empirical functionalist is to believe that functionalism so defined is true.⁹

For example, one of Novick's examples of a structuralist subordination argument is Goldschmidt's saltationism, according to which speciation and macroevolution are not the accumulated result of microevolutionary processes but rather require macromutations ('hopeful monsters'): large, single jumps in morphospace resulting from changes in the developmental system. Selection can then discard or preserve these saltations, but this is a secondary (subordinate) role, in this context (Novick *ibid*, 42). This is a restricted SSA, applying only to macroevolution, and only to multicellular organisms. And it seemingly has no implications for 'unity of type' arguments between functionalists and structuralists: whether structural correspondences across taxa have functional or non-functional explanations. Hence, it appears to be compatible with functionalist interpretations of unity of type, such as Cuvier's view (*ibid*, 41) that unity of type within *embranchements* was the result of the non-viability of forms intermediate between those *embranchements* (if a macromutation gave rise to such a non-viable intermediate form, it would be selected against, on Goldschmidt's view; but the jump from one viable functionally-integrated unit in Cuvier's sense to a radically different viable functionally-integrated unit, would require a macromutation), or Darwin's view that the structural features shared across taxa are the result of past selection and adaptation (after all, for Goldschmidt, new forms need to be adaptive to be preserved by selection; the tetrapod limb may have arisen initially through one (or several) macromutations, but it would not have been preserved had it not been adaptive for the organisms that possessed it). That is, one could seemingly accept Goldschmidt's SSA with respect to macroevolution, while accepting FSAs with respect to unity of type. Not all SAs are independent of one another in this way. Goldschmidt's view is clearly incompatible with Novick's FSA4 – the view of the architects of the Modern Synthesis that 'natural selection is the sole direction-giving factor in evolution' (*ibid*, 41–42). But that is just because this is a rival theory within (or including) the same domain as Goldschmidt's: the domain of macroevolution. When theories or explanations pertain to different domains, one may, as Novick claims, accept a SSA for one domain and a FSA for the other. This in turn makes possible judgments to the effect that, say, SSAs succeed in a greater number of domains than FSAs, thus grounding a commitment to a moderate but perfectly general empirical structuralism.

⁹As Rose Novick has pointed out to me, the analogy is imperfect. Evolutionary lineages of multicellular organisms are readily comparable: when we say 'most lineages exhibit punctuational change' we are comparing oranges with oranges and our statement is meaningful. But domains across which functionalist or structuralist explanations apply vary enormously, and indeed encompass every domain of living things, such that a statement like 'in most domains functionalist explanations are dominant' quantifies over an extremely heterogeneous set and may be of questionable intelligibility. The point is well taken, but arguably Novick is already quantifying over this set, and treating domains as countable and comparable, when she suggests that 'in some domains' functionalist explanations are dominant, and in others structuralist ones are. If this statement is intelligible, it's not clear why 'in *most* domains functionalist explanations are dominant' is not also intelligible.

5 Non-empirical functionalism and structuralism

In my (2015) I do not deny the existence or importance of empirical forms of functionalism and structuralism; indeed they play an important role in my argument.¹⁰ One form of empirical functionalism I discuss is *empirical adaptationism* (Godfrey-Smith, 2001), the view that:

Natural selection is a powerful and ubiquitous force, and there are few constraints, except general and obvious ones, on the biological variation that fuels it. To a large degree, it is possible to predict and explain the outcome of evolutionary processes by attending only to the role played by selection. No other evolutionary factor has this degree of causal importance (*ibid*, 336).

This is closely related to Novick's Functionalist SA4:

[N]atural selection is the sole direction-giving factor in evolution. While allowing the existence of minor nonselective sources of direction (e.g., correlated growth ...), they insisted on the primacy of natural selection... (Novick *ibid*, 41-42).

If Novick is right of course, global SAs such as this fail. In the previous section I suggested a way to make sense of a global form of empirical functionalism and structuralism even if Novick is right about the failure of unrestricted SAs.

But I have argued that we miss something important if we restrict our attention to such empirical claims.¹¹ A way to see this is to distinguish two senses of subordination:¹²

- An empirical, factual claim about explanatory priority, relative frequency, or causal importance; e.g. locally or globally, structuralist explanations are legitimate but play a subordinate role to functionalist explanations.
- A non-empirical, nonfactual claim concerning the most interesting, important, puzzling, intriguing or striking phenomena, facts and processes where this may be interpreted in terms of human preferences, purposes and values.

These are, strictly speaking, independent of one another. For instance, one may hold that in the majority of domains and contexts, with respect to the empirical question, structuralist explanations dominate, and to the extent that functionalist explanations

¹⁰Thus Novick misrepresents my position in implying that it ignores or downplays empirical forms of these positions: the stance approach, she claims, 'highlights the nonempirical aspects of structure/function disputes at the expense of their empirical aspects' (Novick *ibid*, 56). In fact I acknowledge the existence and importance of both of these aspects, and am interested in exploring the relations between them.

¹¹To return to punctuated equilibrium, we may also distinguish PE as an empirical claim, from a non-empirical, metaphysical form of punctuationism understood as a philosophical stance that influenced the development of PE (Boucher, 2019; Gould, 2002), but is independent of it, such that one may rationally endorse the metaphysical version, while rejecting the empirical version, and vice versa.

¹²For similar distinctions with respect to adaptationism, see Godfrey-Smith (2001) and Lewens (2009).

are in play, they are subordinate, while also holding that the domains and contexts in which functionalist explanations dominate are the *most important* ones.¹³ The thought is that even if structuralist explanatory strategies (structuralist explananda and explanans) enjoy a dominant relative frequency, functionalist explanatory strategies (functionalist explananda and explanans) are particularly important and central. To put it crudely, structuralism might prevail in all the unimportant or uninteresting domains; functionalism prevails for the minority that really matter. As Dawkins puts it, ‘large quantities of evolutionary change may be non-adaptive, in which case these alternative [non-adaptationist] theories may well be important in parts of evolution, but only in the boring parts ...’ (Dawkins, quoted in Godfrey-Smith, *ibid*, 340).

Thus I suggest (2015) that fundamental to the functionalist (structuralist) stance is the identification of certain phenomena as particularly in need of explanation: functionalists find adaptation and apparent design the most striking, fascinating, puzzling, fact of nature, the one most crying out for rational explanation; for structuralists it is unity of type resulting from limits on possible form that occupies this central position. But this is a disagreement at the level of values and preferences, i.e., the level of a stance.

On the functionalist side, this is, I argue (*ibid*), quite close to what Godfrey-Smith means by ‘explanatory adaptationism’, the view that:

‘(t)he apparent design of organisms, and the relations of adaptedness between organisms and their environment, are the *big questions*, the amazing facts, in biology. Explaining these phenomena is the core intellectual mission of evolutionary theory. Natural selection is the key to solving these problems; selection is the *big answer*’ (Godfrey-Smith *ibid*, 336).

I argue (*ibid*) that explanatory adaptationism is closely related to the functionalist stance (it’s the Darwinian version of it; the pre-Darwinian version agrees with the ‘question’ part, but offers a non-evolutionary answer). Notice that it’s not *just* the claim that adaptation is explained by natural selection (i.e. an explanatory strategy in Novick’s sense). It’s the claim that adaptation is explained by natural selection, *and thus, given that adaptation is the big problem, natural selection is the big answer*.

One point I make (*ibid*), following Godfrey-Smith, is that explanatory adaptationism is logically independent of empirical adaptationism/functionalism. One can accept, as an empirical claim, that the latter is false or limited, while still being an explanatory adaptationist, as one may still regard adaptation and apparent design as the most startling phenomena of the natural world, even if rare.

Recall the form that explanatory strategies take for Novick:

Functionalist explanatory strategy:

- Explanandum: *form*
- Explanans:

¹³ Of course, if one’s empirical structuralism is strong enough – if one endorses a global SSA, for instance – it is hard to see how this could be combined with non-empirical functionalism.

- Abstract: *Functional needs determine form*
- Concrete (generated by specifying the causal link between function and form):
 - Divine creator considers species needs (Paley)
 - Environmental changes generate functional variants (Lamarck, Jablonka)
 - Natural selection favours functional variants (Darwin, Dobzhansky)

In light of the above discussion, we can now see that what is missing from this (or at least obscured) is the centrality for functionalists of both pre- and post-Darwinian varieties, of explaining *adaptation*. The only explicit explanandum in the schema is *form*. Functionalists are of course interested in explaining organic form (as are structuralists), but just as importantly, they want to explain why *the forms of organisms fit them so appropriately to their environments; why they have the appearance of having been designed to fit their environments*. Darwin's great achievement was not that his theory of natural selection explained organic form *per se*, but that it explained adaptation: not just the form of the bird's wing, but the fact that the form of the bird's wing adapted the bird so well to its environment. What the above schema leaves out, in other words, is adaptation (or apparent design) as an *explanandum*.

I submit that the functionalist explanatory schema actually involves two steps: first, form is (usually; see below) explained in terms of adaptation (here adaptation is the *explanans*); then, adaptation is explained in terms of specific theories about how organisms come to be adapted to their environments (here adaptation is the *explanandum*):

Revised functionalist explanatory strategy:

- *Explanandum* - Form
- *Explanans* - Adaptation: organisms have the form they do because it fits them to their environment
 - *Explanandum*: Adaptation
 - *Explanans*:
 - Divine creator considers species needs (Paley)
 - Environmental changes generate functional variants (Lamarck, Jablonka)
 - Natural selection favours functional variants (Darwin, Dobzhansky)

The revised schema, unlike Novick's schema, allows us to see how and where stances enter the picture. On Novick's schema, the functionalist is saying 'here is something – form – to be explained; and here is how to explain it'. Such a version of functionalism is minimalist and value-free, as Novick wishes explanatory strategies to be. But what it doesn't capture is the sense – plausibly definitive of functionalism – that certain *explananda* are *particularly central and important* (and thus that their explanans are also important). The functionalist endorses the above schema, but that is not all

they do; they also designate adaptation to be an *explanandum* for which it is particularly important to supply an *explanans*.

Notice that while the structuralist does not endorse the first part of the schema (since she explains actual form at least partly in terms of the structure of the space of possible form), she can endorse the second part (though of course it will not form part of any structuralist explanatory strategy *as such*). Adaptation is not for her the primary explanation for organic form (though of course it can be a subordinate explanation, playing secondary role). But she needn't deny any of: (a) that adaptation exists, (b) that it requires explanation, or (c) that it is explained by one of the specific explanans proffered by the functionalist.

So while we need to add the second part to the functionalist explanatory story, we need to do more than this: we need to add that, for the functionalist, adaptation is not (as it is for the structuralist) just one *explanandum* among others. It is not one phenomenon that we may wish to explain, if we so choose. It is an *especially pressing* explanandum, one that forces itself on our attention. Adaptation and apparent design in the natural world are, as Godfrey-Smith (*ibid*) puts it, 'the big questions'. But this is precisely the attitude characteristic of functionalism as a stance. Unless we build these attitudes into the functionalist schema, the second part of the schema will not be distinctively functionalist.

Thus, I propose a modification to my revised functionalist explanatory strategy, with the following added to the bottom of the schema:

- Judgment of importance: adaptation is an especially important *explanandum*, imparting importance to the *explanans* that is favoured.¹⁴

What we have arrived at is an explanatory schema for functionalism that is not just an explanatory strategy in Novick's minimalist sense, but one that builds in the attitudes and values characteristic of the functionalist stance. This gives us a functionalist explanatory schema worthy of the name.

Novick may respond: of course for the functionalist explaining adaptation is especially pressing, since for her (unlike the structuralist), adaptation is the explanation of form! We don't need to bring in value-judgements of relative importance other than that. In response, I would suggest that the virtue of distinguishing the two parts of the schema lies precisely in the fact that we can thereby bring out their *relative independence*. The functionalist typically thinks form is to be explained primarily by reference to adaptation, but even if this turned out to be (sometimes or always) untenable, the second part of the schema could still hold. Indeed we have seen that functionalists can (and some possibly do) think that selection and adaptation are rare (such that it is not the case that, in general and across the board, form is explained by adaptation), yet still count as functionalists because they endorse the second part of the functionalist schema: adaptation is explained by (say) selection, and thus, given that adaptation is the big question, selection is the big answer. In Novick's schema there is no place for this kind of functionalist. We need to allow for the functionalist to assert that adaptation is an especially important *explanandum* (imparting impor-

¹⁴ Novick argues that such judgments of importance are deeply problematic; I reply to her argument below.

tance to the *explanans* that is favoured) *even if* it is not the primary explanation of form in all or many cases.

I've been focusing on functionalism but similar things can be said about structuralist explanatory strategies. Novick suggests they have the following form (*ibid*, 18):

Structuralist explanatory strategy:

- *Explanandum*: form
- *Explanans*:
 - Abstract: The structure of the space of possible form determines (actual) form.
 - Concrete (generated by specifying the source of this structure):
 - Archetype constrains form (Goethe, Owen)
 - Biophysical processes constrain form (Lamarck, Thompson, Newman)
 - Developmental processes constrain form (Goldschmidt, Alberch)

Again, it would, I suggest, be more illuminating to separate out two explananda: (*actual*) form, and *limits on possible form*:

Revised structuralist explanatory strategy:

- *Explanandum*: form
- *Explanans*: The structure of the space of possible form determines (actual) form.
 - *Explanandum*: Limits on possible form (often giving rise to 'unity of type')
 - *Explanans*:
 - Archetype constrains form (Goethe, Owen)
 - Biophysical processes constrain form (Lamarck, Thompson, Newman)
 - Developmental processes constrain form (Goldschmidt, Alberch)

While the functionalist does not typically endorse the first part of the schema (since she typically explains form in terms of adaptation), she can endorse the second part (though of course it will not form part of any functionalist explanatory strategy *as such*). Limits on the space of possible form are not for her the primary explanation for organic form (though of course it can be a subordinate explanation, playing a secondary role). But she needn't deny: (a) that such limits exist, (b) that they require explanation, or (c) that they are explained by one (or more) of the specific *explanans* proffered by the structuralist.¹⁵

So we need to add that, for the structuralist, limits on the space of possible form, often giving rise to 'unity of type', are not (as they are for the functionalist) just one *explanandum* among others - one phenomenon that we may wish to explain, if we so

¹⁵Amundson (1994) suggested that these sorts of limits or constraints are sometimes thought of as constraints on form and sometimes as constraints on function, and it is important to distinguish these. I discuss Amundson's arguments below.

choose. It is an *especially pressing* explanandum, one that forces itself on our attention, and one that thereby confers an importance on the favoured *explanans*.

Thus, I propose a modification to my revised structuralist explanatory strategy, with the following added to the bottom of the schema:

- Judgment of importance: limits on possible form are an especially important *explanandum*, imparting importance to the *explanans* that is favoured.

Again, Novick may protest that the only reason the structuralist has for taking limits on possible form to be an important *explanandum* is that they are what explains actual form. But again, while this may often be true, it need not be. As with functionalism, the two parts of the schema are relatively independent. They are not perhaps *as* independent as is the case for functionalism: while one may be a functionalist even if one thinks adaptation is rare and is not in general the explanation for form, it would be an odd type of structuralist who held that limits on possible form were rare or weak, and didn't play a major role in the explanation of actual form. There is an asymmetry here, I concede. Yet the structuralist could seemingly accept that limits on possible form do not explain actual form *to any greater degree* than, say, adaptation does. She could accept that limits on possible form, while important in explaining form, are not the *only*, or even the *most*, important factor. Indeed this is often what structuralists say: that all they're campaigning for, at the end of the day, is for structural factors to be given their due; to be acknowledged, alongside functional factors, as equally significant determinants of form, rather than consigned to the margins: they would be content with 'equal time' for internal, structural constraints. Such a person would still be a structuralist if they endorsed the second part of the structuralist schema: limits on possible form are explained by X, and thus, given limits on possible form is the big question, X is the big answer. We need to allow for the structuralist to assert that limits on possible form is an especially important *explanandum* (imparting importance to the *explanans* that is favoured) *even if* it is not the primary explanation of form in all or many cases.¹⁶ Novick's austere schema does not allow us to do this, but my expanded schema, building in the values and preferences of the structuralist stance, can.

6 The value of stances

In this section I will consider the normative question about stances in biology: given they exist, are they beneficial, or harmful, to inquiry? To introduce the problem, let us return for a moment to empirical functionalism and structuralism. I accepted, for

¹⁶Gould appears to be just such a structuralist: he tends to advocate for equal time, rather than explanatory priority, for internal, structural factors, while admitting that he finds such factors much more interesting, striking, intriguing, and more crying out for explanation, than external, functional factors (Gould *ibid*). And the natural way of interpreting the structuralism of advocates of the Extended Evolutionary Synthesis is as the view that 'internal' or 'constructional' factors such as developmental bias and niche construction should be seen as being *just as* significant as factors such as selection when it comes to explaining phenotypic evolution and adaptation, not as being *more* significant (Laland et al., 2015).

the sake of argument, Novick's suggestion that at least some FSAs and SSAs – when pertaining to different domains – were independent of one another, such that one may, in principle, pick and choose among them. One may rationally accept an SSA with respect to macroevolution, while accepting an FSA with respect to unity of type, for example. And I suggested that on this basis one could redefine empirical functionalism and structuralism as *dominant relative frequency* claims, such that we need not follow Novick in supposing that the failure of global subordination arguments means that there can be no justification for a general empirical functionalism or structuralism.

But while Novick may be correct that, logically speaking, SSAs and FSAs are independent of one another when pertaining to different domains, making a 'pick and choose' strategy rationally permissible, the fact remains that in practice, few have opted for this strategy. Novick notes that a number of SAs are (at least potentially) universal in scope, including all the FSAs she discusses. I am accepting her claim that such universal SAs all fail, but even when we consider restricted SAs, one would be hard pressed to find theorists accepting SSAs in some domains and FSAs in others. Functionalism (structuralism) in one domain tends to be accompanied by functionalism (structuralism) in other domains. For instance I suggested that Goldschmidt's SSA with respect to macroevolution was compatible with Darwin's FSA with respect to unity of type. But whether anyone has actually accepted this combination of views is another matter. The stance theorist has a ready explanation for this: insofar as local SAs in different domains are all expressions or manifestations of a particular stance, they naturally cluster together, philosophically as it were.

By way of comparison, positions in evolutionary biology have tended to cluster around two opposed philosophical poles (Sterelny, 2001, 4–5): the 'American' school tends to favour pluralism and hierarchical conceptions of selection, rejects adaptationism and extrapolationism and tends to be sceptical of the application of evolutionary biology to human behaviour, while the 'British' school tends to favour reductionism, adaptationism, extrapolationism, and the gene's eye view, and be more open to sociobiology and evolutionary psychology. These various positions are for the most part logically independent of one another. Thus Sterelny has argued that their tendency to cluster in these ways is 'due to historical accident' (*ibid*, 5). Yet one could also argue that the clustering of views is a reflection of the fact that they are expressions of philosophical stances, even if they are logically independent (Boucher, 2018). Gould, for instance, notes the 'common underlying vision' underlying the various positions he defends, involving the notions of 'complexity, interaction, multiple levels of causation, multidirectional flows of influence, and pluralistic approaches to explanation in general', while in the positions defended by his opponents we find the 'designation of a privileged locus of causality, a single direction of causal flow, and a smooth continuity in resulting effects' (Gould *ibid*, 31).

We need to distinguish the descriptive question about functionalism and structuralism – *are they* stances or explanatory strategies (or both)? – from the normative question – *should they be* stances or explanatory strategies (or both)? Novick concedes that I may be partly right on the descriptive question: perhaps these stances do exist and do in fact play some role in biological inquiry (while maintaining that they also take the form of explanatory strategies). It is really the normative question she is most

concerned with: maybe these stances do exist *but they shouldn't*.¹⁷ Biology does not progress, and empirical function-structure disputes do not get resolved, through theorists adopting, and theorising and arguing from the perspective of, value-laden philosophical stances. Thus she would likely accept – as a descriptive claim – my diagnosis that the reason why logically independent positions (context-relative SAs) tend to cluster together in predictable ways is due to their association with overarching philosophical stances, embodying certain distinctive values, preferences and attitudes, the adoption of which makes certain types of view or forms of explanation attractive and others unattractive. But she will insist on the normative point (one shared by Sterelny in the above example), that this situation is unnecessary and unfortunate, in that it impedes scientific progress, encourages entrenched philosophical/ideological wrangling, and makes the integrative, ecumenical approach she recommends harder to achieve. More specifically, it is when stances embody (as I have suggested the functionalist and structuralist stances do) *judgments of importance* (as opposed to just (unavoidable) personal preferences), that these regrettable results ensue. Call these *Importance Stances*.

My worry centers around one particular aspect of the structuralist and functionalist stances, as Boucher (2015) describes them: they involve judgments of which phenomena are *important*. Such judgments are distinct from merely personal fascination with some phenomenon. A biologist fascinated by unity of type and a biologist fascinated by adaptation are different, but they are not (yet) in conflict. A judgment of importance, by contrast, reaches beyond the personal to make a claim about what really matters to evolutionary theorizing: what must be explained, what is most central to the theory, what lines of research will be most fruitful, and so on ... Unlike a mere personal preference, a judgment of importance seeks the assent of others: they, too, should share it (Novick *ibid*, 57–58).

This seems correct, but Novick goes on to offer two criticisms of Importance Stances: firstly, they are unnecessary, and secondly, they are harmful (*ibid*, 58–59). On the former point, I am happy to concede that adopting an Importance Stance is not necessary for engaging in function-structure disputes, or offering functionalist or structuralist theories or explanations. One may do these things while adopting a value-laden stance which is not an Importance Stance, or indeed while adopting no stance at all. I accept these points, indeed I insist upon them.¹⁸ Stance can be beneficial for inquiry without being in any way necessary for inquiry. On the second point, Novick suggests that Importance Stances are harmful because (1) ‘Such judgments of importance are

¹⁷The way she puts it is that we can ask two questions: an *explanatory* one (‘why does the history and present of biology look as it does?’) and an *action-guiding* one (‘how ought we to approach such issues?’). On the former, the stance view and the explanatory-strategy view are, she says, both correct, and complementary; on the latter, she rejects the stance view (*ibid*, 56).

¹⁸In my (2015) I note that one may accept empirical adaptationism, and may accept that adaptation is a problem that needs to be solved, without accepting the functionalist Importance Stance, and in my (2019) I note that one may accept empirical forms of, for example, punctuatedism, without accepting the punctuatedist stance.

wrong’ – functionalist and structuralist explanations have clearly each been important in the history of biology; (2) ‘judgments of importance render even the empirical portions of structure/function disputes less tractable than they would otherwise be’; and (3) ‘judgments of importance promote antagonistic over nonantagonistic interactions. They provide reason to dismiss possibilities of integration’ (*ibid*).

With respect to (1), the proponent of the functionalist stance need not deny that structuralist *explananda* and *explanans* have often been important; she just insists that functionalist *explananda* and *explanans* are *more* important. Novick’s critique of Importance Stances seems to rely on an uncharitably strong interpretation of their commitments. She suggests that the proponent of an Importance Stance must regard all phenomena other than those that the Importance Stance regards as centrally important as *unimportant*: ‘Evolutionary theorizing that treats one or the other [functionalist or structuralist explanations] as unimportant is going to be impoverished ...’ (*ibid*, 59). But if one adopts an Importance Stance one is not thereby required to insist that other phenomena are *unimportant* – just that they are *less* important than the phenomena the Importance Stance regards as central.¹⁹

With respect to (2) and (3), what evidence does Novick present for the claim that Importance Stances have these effects, or for the claim that to the extent that they do, this is uniformly a bad thing? She adverts (*ibid*) to a classic paper by Ron Amundson (1994), in which he argues that in the early debate about adaptationism and constraints (sparked by Gould & Lewontin, 1979), each side was working with a different understanding of ‘constraint’: adaptationists understood it to mean ‘constraints on adaptation’, a notion they (rightly) believed to be fully compatible with adaptationist neo-Darwinism, while structuralists understood it to mean ‘constraints on form’, a notion that does have the potential to challenge the central tenets of adaptationism. Novick suggests (pers. commun.) that it was theorists’ adherence to Importance Stances that blinded them to the distinction. Because adaptationists considered adaptation to be *the most important explanandum*, the primary explanatory target for evolutionary theory, they assumed constraints were constraints on adaptation, and as a result they talked past their opponents, who were focusing on different *explananda*, misunderstanding the nature and seriousness of the structuralist and developmentalist challenge.

In response, I would draw attention to the fact that this phenomenon of important distinctions and divergent meanings of terms or concepts being overlooked due to theoretical commitments or for some other reason, with the result that disputants tend to talk past one another and unnecessary conflicts ensue, is very widespread, and usually has nothing to do with Importance Stances. A standard form philosophy

¹⁹Novick has objected (pers. comm.) that I misrepresent her view here, that she does not think that proponents of an Importance Stance are compelled to regard other phenomena as unimportant. Yet when she says: ‘Evolutionary theorizing that treats one or the other [functionalist or structuralist explanations] as unimportant is going to be impoverished ...’, she seems to be expressing precisely this view. She goes on to suggest that adopting, say, the functionalist Importance Stance will cause one to ‘neglect’ structuralist explanations (*ibid*). But again, one may regard function as more important than structure without ‘neglecting’ structuralist explanations. If A thinks X is a more important explanatory factor than Y it doesn’t follow that A must *neglect* Y. A may regard X and Y as both very important, and accept that both need to be included in a full explanation of the relevant phenomenon, but still A may regard X as somewhat more important than Y.

articles take is: ‘debates about X have thus-far been vitiated by the fact that it has not been recognised that there are two (sometimes more) forms/versions of or questions concerning X; once we disambiguate, we will see that theorists have been talking past one another or engaging in pointless disputes’. To give just two examples from the philosophy of biology, Devitt (2008, 2011) argues that the failure to distinguish between two questions regarding species – the ‘taxon’ question and the ‘category’ question – has led to much confusion in the literature on species; while Lloyd (2017) argues that the failure to distinguish several separate issues to do with the units of selection has led to much confusion and pointless wrangling in the units of selection literature.²⁰ Amundson’s paper is just another example of this venerable philosophical genre. Thus, even if Novick is right that in the constraints case it was theorists’ adherence to Importance Stances that was the source of the conceptual confusion (a claim I am willing to grant), it seems a little unfair to treat this as a major objection to Importance Stances *in particular*, given how common such confusion seems to be. If Kuhn is right, of course, we find this conceptual mismatch and mutual incomprehension whenever scientists working within different paradigms attempt to communicate using terms whose meanings are fixed by the rules of those paradigms. Even if we don’t accept the strong version of the incommensurability thesis, it seems evident that the sort of conceptual mismatch and talking past one another exemplified by the early constraints debate is a very widespread – and probably unavoidable, albeit regrettable – feature of scientific and philosophical debate, with or without Importance Stances, and it is thus implausible to regard Importance Stances as especially blameworthy in this regard.

Detailed historical and empirical work would presumably need to be conducted in order to establish whether the effects of biologists adopting (explicitly or implicitly) Importance Stances have been on the whole harmful or beneficial, in the ways Novick mentions or in other ways.²¹ But I think we have a priori reasons for supposing that at least a lot of the time, the effect is likely to be positive. If a scientist regards a phenomenon as not just subjectively interesting but *particularly important for scientific theorising*, particularly in need of explanation (for whatever reason) she is likely, after all, to be highly motivated to attempt to explain it, and this may well lead to theoretical progress.

In a passage from my (2015) that Novick does not engage with, I suggest that this has likely been the case in the history of biology:

[T]he identification of adaptation and apparent design as the central explanatory problems for biology acted as a powerful prod for Darwin’s theory of natural selection, which purported to explain precisely these things. But it has likely acted as a stimulant for the development of any number of empirical hypotheses

²⁰ Amundson likens the confusion about the concept of constraint to the confusion surrounding the concept of mutation in the period prior to the Modern Synthesis, with Mendelians and Darwinians attaching different meanings to the concept, reflecting their theoretical differences. It seems unlikely this was the result of rival Importance Stances.

²¹ There has not been much work of this kind done to investigate whether adopting stances has beneficial or detrimental effects on scientific practice, but for an exception see Forbes (2017); for further discussion see Boucher and Forbes (2024).

and research programs in functional biology. Empirical adaptationism itself, as a position and as a research program, as well as more specific empirical hypotheses within that research program, have undoubtedly felt the influence of the functionalist/adaptationist stance ... If a biologist adopts the position that functional adaptation is the most important and interesting feature of the natural world, clearly she is likely to be inspired to study and theorise about particular examples of functional adaptation. So the adaptationist stance has the effect of highlighting adaptation-related empirical problems (Boucher, 2015, 398–399).

If all that was involved in the clash of the functionalist and structuralist Importance Stances was that one side was insisting ‘adaptation is the most important *explanandum!*’ and the other side was replying, ‘No, unity of type is the most important *explanandum!*’ ‘Adaptation!’ ‘Unity of type!’ ... then Novick would have a point about this being unproductive. But if the main thing a scientist who has adopted an Importance Stance is prompted to do – as seems likely - is get on with the business (or encourage others to get on with the business) of attempting to explain the *explanandum* their Importance Stance identifies as particularly important, rather than wrangle endlessly with proponents of rival Importance Stances about the fact that it *is* the most important, the effects of adopting an Importance Stance would it seems be conducive to scientific progress.

In the end, I suspect the distinction Novick draws between stances that embody personal preferences (which she’s happy to regard as beneficial) and Importance Stances, may come to less than she suggests. As Godfrey-Smith (2001) and I (2015) note, even if judgements of importance may seem to have the form of objective, scientific claims demanding the assent of others, they may in fact amount to little more than an expression of personal preferences reflecting subjective values and psychological factors, and thus, by Novick’s lights, would be rendered unobjectionable, indeed beneficial. The position I am defending can, it seems to me, remain neutral on whether or not this is the case.

7 Higher-level stances?

At the end of her book, Novick makes what appears to be a significant concession to my view. She suggests²² that the rival views about the nature of functionalism and structuralism (whether they are stances or explanatory strategies) are themselves expressions or manifestations of higher-level value-laden philosophical stances.

The view that functionalism and structuralism are stances that I defend derives from a stance that tends to celebrate the role of general, large-scale philosophical positions or worldviews within science, and to see entrenched theoretical disputes as both an inevitable, and frequently a positive, productive, feature of science. Call this the *oppositionist stance*.²³ The explanatory strategy view that Novick defends on the

²²This is my gloss on what she says here, she doesn’t put it in quite this way.

²³I also suggest (Boucher, 2019) that the idea that positions in science are philosophical stances derives from a higher-level stance, but identify this stance not with the *oppositionist* stance, but simply with the

other hand derives from an *integrationist stance* that is sceptical of the value (though not the existence) of these entrenched positions and philosophical oppositions within science, seeing them largely as impediments to scientific advance, and recommending we take ‘our debates smaller and more local, away from stances and general theories ...’ (Novick *ibid*, 62).

It is noteworthy that Novick takes quite a different attitude to this higher-level stance conflict than she does to the lower-level stance conflict (between the functionalist and structuralist stance). She does not admit the existence of the higher-level stances but bemoan their malign influence: as a normative claim she seems happy to endorse the theoretical and philosophical value of the higher-level stances, at least inasmuch that she openly admits that she has adopted, and theorises and argues from the perspective of, the integrationist stance, disdains the oppositionist stance as anathema to the values and attitudes that have always informed her work, and proffers no self-admonition for doing so. She does not, as one might expect given her earlier remarks, recommend abandoning the entrenched opposition between the oppositionist and integrationist stances, in favour of ecumenical integration at the higher level: i.e. ‘sometimes integration and taking debates smaller is preferable, sometimes entrenched opposition and keeping debates large and general, is preferable – it depends on the context’. That is, she does not apply the integrationist stance to itself. Steadfastly and passionately advocating the integrationist stance in a highly committed and partisan way – being non-integrationist about integrationism in other words – threatens to collapse into incoherence, or self-refutation.²⁴

Setting aside the incoherence worry, we can ask the question: why should stances have a malign influence within science, while having a benign or even beneficial influence when it comes to interpreting disputes in science – why, in other words, are stances bad for science but good for the philosophy of science? At least, Novick needs to explain why there is this difference, since on the face of it the two levels of stance-dispute are on a par. If the integrationist stance *qua stance* is valuable and important, it’s not clear why the functionalist or structuralist stances may not be equally valuable and important.

empiricist stance: in interpreting metaphysical positions as nonfactual stances, the empiricist can do justice to the role played by metaphysics in science while honouring empiricist scruples about metaphysics.

²⁴ See Boucher (2012) on the way in which self-refutation and incoherence can loom when certain stances get applied to themselves. Applying the oppositionist stance to itself is much less problematic of course, since it leads one to interpret the opposition between oppositionalism and integrationism as a positive and productive thing, and recommends the partisan of the oppositionist stance continue in her partisanship!

There is a similarity here to the dispute in the epistemology of disagreement between the ‘steadfast’ and the ‘conciliatory’ view (on the former, in the case of disagreement between epistemic peers, one is justified in sticking to one’s guns; on the latter, one is rationally required to suspend judgment, or at least lower one’s confidence that one is right): if the conciliatory view is applied to itself, incoherence or self-refutation threatens, since in the likely event that those who advocate the rival steadfast view are one’s epistemic peers, the view instructs one to suspend judgement or lower one’s confidence in the truth of conciliationism itself!

8 Conclusion

Suppose it turned out, and everyone agreed, that functionalist and structuralist explanatory strategies are equally effective/fundamental, i.e. global subordination arguments all fail, and the strategies are dominant in more or less an equal number of cases. On Novick's account (and she admits this), this would mean that no-one would, or should, be a functionalist or structuralist anymore, except in the extremely narrow and local sense of being a functionalist *with respect to problem X in context C*.

'I therefore hope, if perhaps in vain, for a future biology free of structuralist and functionalist stances. Evolutionary biology needs structuralist and functionalist explanations, and even structure/function disputes, but ... it has no need of structuralists and functionalists' (*ibid*, 59).

But this is surely implausible. Hankering for the complete deflation of such philosophical positions and disputes is, I claim, hankering after something that is both unattainable and undesirable. It is perennially tempting to reduce (or replace) long-standing philosophical/ideological disputes to empirical and explanatory concerns that can be decided by scientific evidence. Even more so if it turns out neither side is really correct and everyone can accept the happy integrative thesis Novick recommends. How appealing to 'leave behind intractable conflicts' (*ibid*, 59)! But I think this is not just unrealistic, but undesirable: philosophical stances can, I suggest, play a positive role in science in shaping and guiding empirical and theoretical research, drawing attention to previously overlooked phenomena, highlighting features of the world that might have been obscured by rival perspectives, and making progress on hitherto intractable problems.²⁵ They present risks, to be sure, of dogmatism, bias and intolerance, as Novick highlights, but potential benefits too (reflecting the risks and benefits of the influence of values in science generally). We need not fear them.

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²⁵ See Hein (1969) who defends a similarly positive view about the role played in science by what she calls 'meta-theoretical commitments', which are much like stances in our sense. Her focus is the perennial dispute between holism and reductionism in biology. She offers an argument for construing these as stance-like positions that is similar to the one I offer with respect to functionalism and structuralism, appealing to the apparent continuity of philosophical commitment across changes in theory, uniting old and new reductionists, and old and new holists. The value of stance-conflict she particularly draws attention to is the way it forces proponents of one stance or approach to revise and improve their theories, concepts and methods in response to challenges presented by proponents of the opposing stance or approach.

Declarations

Competing interests There are no competing interests to declare.

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