

Time for Pragmatism

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*Ours is the eyes' deceit
Of men whose flying feet
Lead through some landscape low;
We pass, and think we see
The earth's fixed surface flee:-
Alas, Time stays, -we go!*

– Dobson, 'The Paradox of Time' (1886)

Abstract: Are the passage of time and the distinction between past and future features of the world in itself, or manifestations of the human perspective? The latter view has much in common with pragmatism, though few of its proponents think of themselves as pragmatists, and pragmatists are often unaware of this congenial application of their methodology. This link between time and pragmatism only scratches the surface of the deep two-way dependencies between these two topics. The human temporal perspective turns out to be deeply implicated not merely in our temporal notions themselves, but in many other conceptual categories – arguably, in fact, in all of them, and in the nature of language and thought. In this way, reflection on our own temporal character vindicates James' famous slogan for global pragmatism: 'The trail of the human serpent is thus over everything.'

1. Introduction

In this chapter I explore the connections between neo-pragmatism and time. These connections run in both directions, but in keeping with the theme of this volume, I'll frame the central issue from the neo-pragmatist side. How is time, and its philosophy, relevant to the concerns of neo-pragmatism?

I'll offer an answer in six steps:

1. Temporal indexicals
2. Further features of 'manifest time'
3. The 'temporal modalities': probability and causation
4. 'Future-facing' properties and concepts in general
5. The trans-temporal character of language
6. Predictive processing and the future-facing character of mind.

There will be some overlaps, and also a natural progression. Treated as a stairway, these steps lead in the direction of generality. One of my goals is to show that approaching neo-pragmatism from this direction reveals senses in which it is necessarily a *global* viewpoint, applicable throughout language and thought.

In this respect, I will thus be defending what I have elsewhere called a global pragmatism, or global expressivism. My central message is that the human temporal perspective turns out to be deeply implicated not merely in our temporal notions themselves, but in many other conceptual categories – arguably, in fact, in all of them, and in the nature of language and thought. In this way, reflection on our own temporal character vindicates James’ famous slogan for a global pragmatism: ‘The trail of the human serpent is thus over everything.’ (James 1907, 64)

The chapter goes like this. In the next section (§2) I’ll explain what I take neo-pragmatism to *be*. In §3 I turn to indexicals, which here do double duty. As a category as a whole, they serve to illustrate what I mean by neo-pragmatism; while in their temporal manifestation, in tensed language, they take us on the first step of our main project. They introduce the idea that distinctions that other views take to be elements of temporal reality, such as a distinguished present moment, are better regarded in a neo-pragmatist spirit as manifestations of our own natural and practical perspective.

The second step, in §4, then follows very naturally. It simply broadens the message to some other aspects of what rival approaches see as elements of the nature of time, to be investigated by physics or metaphysics. Broadening again, the third step (§5) applies a similar lesson to a different set of traditional concerns of metaphysics, that of modal notions such as chance and causation. The neo-pragmatist message here is that the temporal character (among other things) of these notions is best explained, not as some sort of primitive or even derivative feature of things in the world, independent of the perspective of us users of the concepts in question, but as a reflection of our own epistemic, agential, and (especially) temporal viewpoint.

This third step is still ‘local’, in the sense that it concerns only a comparatively small class of categories, the temporal modalities. In §6 the fourth step, by contrast, takes the underlying insights about the human temporal perspective and applies them to a much broader class of properties and concepts – arguably, as we’ll see to all of them. It links what I’ll characterize as a Humean pragmatism about dispositions with a Sellarsian and Brandomian inferentialism about concepts in general. I don’t mean that it treats these as the same thing, but merely that they belong in a similar place when our interest is in highlighting the role that our own temporal character plays in both.

The fifth step (§7) makes a point about the temporal character of language – not a deep point, as we’ll see, though one linked to issues about rule-following that I have long taken to be central to the case for global neo-pragmatism. The sixth step (§8) turns from language to thought. Sketching recent ideas from the literature on ‘predictive processing’, I point out that this approach puts the human temporal situation even more deeply at the core of an understanding of mind and language. Citing recent work by Daniel Williams and Daniel Dennett, I note that this, too, seems to have pragmatist implications.

Dennett’s remarks will lead us back to Hume, and in §9 I discuss the relationship between global neo-pragmatism, Humean naturalism, and natural science itself. I close (§10) by identifying three demarcation issues, whose clear delineation will I hope be helpful in guiding future work on these topics.

2. Pragmatism, neo-pragmatism and expressivism

2.1 Terminological issues

As often happens in philosophy, there are both too few and too many terms in use in this area, and clarification is needed before we begin. On the side of scarcity, there is a variety of views calling themselves pragmatism, not necessarily compatible with one another. My own favorite is what in recent years I've been calling Cambridge Pragmatism. Here 'Cambridge' refers not to the intellectual home of the great American Pragmatists, such as James, Peirce and Dewey, but to the *ur*-Cambridge, seat of a one hundred year pragmatist lineage I take to stretch from Ramsey and Wittgenstein to Bernard Williams, Edward Craig, Simon Blackburn and myself. In two recent books Cheryl Misak (2016, 2020) has shown us how much Ramsey and hence Wittgenstein owed to the original Pragmatists, especially Peirce.

Ramsey is famous as a pioneer of subjectivism about probability – the view that the philosophy of probability begins with the psychology of decision. Less well known is his analogous view about causation, sketched in one of his last pieces ('General propositions and causality', 1929a; hereafter GPC). In 1913 Bertrand Russell had dismissed causation altogether. Physics, he argued, shows us a time-symmetric world of bare associations. Why then do we think that we can affect the future but not the past? Russell attributes it to 'the accident that memory works backward and not forward'. (1913, 20)

In GPC Ramsey doesn't mention Russell,¹ but his investigation of lawlike generalizations leads him into similar territory. He agrees with Russell that we shouldn't count causes among the furniture of the world. As with probability, the interesting questions are matters of 'psychology', as Ramsey says, not metaphysics. The interesting question isn't what causation *is*, but why we humans come to think and talk in causal terms.

This shift from metaphysical questions, on the one hand, to psychological or linguistic questions, on the other, is what I take to be the distinctive Cambridge pragmatist move. We find the same orientation in many later Cambridge philosophers, many of whom wouldn't regard themselves as pragmatists. Examples include D H Mellor's work on tense and chance, Craig's account of knowledge, and Blackburn's views on morality, modality and other topics. (We find the same orientation in other places, too, of course – I was being chauvinistic in claiming it as *Cambridge Pragmatism*!)

I suggested that 'pragmatism' is a case of terminological scarcity – one term being conscripted for too many jobs. I have been explaining my use of 'Cambridge Pragmatism' as a way of distinguishing the variety that has interested me from other claimants. I see *neo-pragmatism* as a welcome (and, happily, less chauvinistic) way of doing the same thing. I propose to use it for the same view.

There is also a problem of terminological excess, to which I'm aware that I have contributed. As noted above, I have also referred to my view as a form of global *expressivism*, and used this label interchangeably with global pragmatism. My justification was that I wanted to mark strong continuities with not one but two existing uses of 'expressivism', by writers such as Blackburn and Gibbard on one side, and Brandom on the other. One of my interests was to connect these major philosophical projects,

¹ He seems to have taken the issue from Eddington (1928); see fn. 7 below.

which had tended to proceed independently of one another, despite obvious affinities (see, e.g., Price 2011c).

Like ‘pragmatism’, though to a lesser extent, the term ‘expressivism’ also suffers from the ‘too many uses’ problem. Many writers think of expressivism simply as a view in metaethics, for example. Again, my use has been the broad one, a fact which goes some way to explaining both how I equate it with a kind of pragmatism, and how I can take it to be a global view.

2.2 *The expressivist recipe*

In recent work (Price 2022b, 2022d, 2023) I have been attempting to distinguish all the major components in contemporary expressivism, as I use the term. I characterize expressivism as a recipe with about five main ingredients. The first ingredient is what I term a *use-first* approach to meaning. Expressivism focusses on how words are *used*, rather than what they are *about*. I have a rather broader conception of the factors the relevant accounts of use are allowed to involve than many expressivists. I think it is unhelpful to restrict them to psychological states, as opposed to more general aspects of speakers’ circumstances.²

The second ingredient is a program that presents itself as an alternative to metaphysics, or ontology. It may be motivated in the same way by so-called ‘placement problems’ – that is, in their typical form, questions about the ‘place’ of some seemingly problematic subject matter (e.g., morality, modality, meaning, or the mental), in the kind of world revealed to us by science. But expressivism combines an insistence that these be regarded as *primarily* linguistic or psychological issues – Why do we talk or think this way? – with a renunciation of the ‘representational’ moves that lead from there back to metaphysics (e.g., that of seeking ‘referents’, or ‘truthmakers’, in some non-deflationary sense).

The third ingredient – closely linked to the first and second – is an explanatory program. It aims, roughly speaking, to account for the *existence* and *practical relevance* of the vocabularies in question; typically the former in terms of the latter, in some way. Why do creatures like us employ these terms and concepts? And why do these terms and concepts exhibit distinctive links to various aspects of our practical lives? I have called the latter question the *Practical Relevance Constraint* (Price and Weslake, 2010; Price 2023, ch. 11), and argued that it is often a great advantage of neo-pragmatism over various rivals that it meets it so easily – much more on this below.

The fourth ingredient, closely linked again to the third and first, rests on identification of *features of speakers* – typically features of practical or ‘pragmatic’ significance – that play characteristic roles in expressivist accounts of particular vocabularies. I have called these features the *pragmatic grounds* of the vocabularies in question (Price 2019a, 146).

² This means that the term ‘expressivism’ is in some ways unhappy, a point in favor of ‘neo-pragmatism’. See (Price 2023, ch. 11) for discussion of this issue, as well as of different conceptions of the proper form of an account of meaning in terms of use – I contrast the approaches of Schroeder (2015) and Williams (2010, 2013), for example. Schroeder thinks of the relevant use conditions simply as assertibility conditions, whereas Williams’ ‘explanations of meaning in terms of use’ (EMUs) offer something considerably broader. Among other things, they involve ‘downstream’ language-exit rules, as well as ‘upstream’ language-entry rules – certainly an advantage in the present context, where our eye is on the future-facing character of language and thought.

The fifth ingredient, finally, is a kind of perspectivalism, with the pragmatic grounds of a vocabulary playing the role of the perspective from which the users of that vocabulary speak. I link this ingredient to the Copernican metaphor familiar from Kant, noting how well it characterizes the sense in which expressivism provides an alternative to metaphysics. What we took to be in need of *metaphysical* investigation is instead explained as a perspectival matter, in which features of our own situation carry the main explanatory burden.

2.3 Neo-pragmatism as subject naturalism

As I say, these are what I take to be the major ingredients of expressivism, as I use the term, or equivalently of neo-pragmatism. I want to emphasize that I take it to be a thoroughly naturalistic program, although not in the sense that many self-styled philosophical naturalists have in mind. In (Price 2004a) I draw a distinction between two kinds of naturalism – roughly, two views of how philosophy properly defers to science. The first kind, the view often called simply ‘naturalism’, is the view, as I put it ‘that in some important sense, all there *is* is the world studied by science’, or that ‘all genuine knowledge is scientific knowledge’ (2004a, 185). I call this view *object naturalism*. It implies that in so far as it is concerned with ontology, or the quest for knowledge, philosophy must in some sense be under the umbrella of natural science, for there is nowhere else to stand – no other object of inquiry.

I contrast object naturalism with a second view:

According to this second view, philosophy needs to begin with what science tells us *about ourselves*. Science tells us that we humans are natural creatures, and if the claims and ambitions of philosophy conflict with this view, then philosophy needs to give way. This is naturalism in the sense of Hume, then, and arguably Nietzsche. I’ll call it *subject naturalism*. (2004a, 186)

I take neo-pragmatism to be a subject naturalist project. It is continuous with natural science in the sense that it is asking first-order scientific questions about natural creatures (mostly but not exclusively ourselves). Typically, for example, it is seeking an understanding of some aspect of the psychology or linguistic behavior of creatures like us.

Next, a word about the relation between neo-pragmatism and Sellars’ famous distinction between the *manifest image* and the *scientific image* (Sellars 1962). A neo-pragmatist about a given topic – say, color – is among other things someone who is inclined to regard the subject matter in question as part of the manifest image, not the scientific image. But it goes beyond this in one important respect, in thinking that the interesting questions in such cases are not metaphysical questions – e.g., What is color? – but what Ramsey called the psychological questions: Why do creatures like us see, conceptualize, and describe the world in these terms? By contrast, it is easy to find examples of philosophers who agree that color is part of the manifest image – a secondary quality, rather than a primary quality, to use an older terminology – but who nevertheless see the job of philosophy as being to say what color *is*. Their answer might be that it is a ‘response-dependent’ property, to use some influential terminology from the 1990s (see, e.g., Haldane and Wright 1993). Some writers (e.g., Johnston 1993) who put their view in these

terms think of it as a kind of pragmatism, but as I noted in (Price 1993), it differs from neo-pragmatism in trying to answer a different question.

A crucial issue for neo-pragmatists concerns the scope of the program. Is neo-pragmatism a *local* view, applicable to some vocabularies but not to others? Or is it, as I have argued, a global view? One of my goals in this chapter is to explain why thinking about time leads a pragmatist to the global conclusion. This is not the only path to the global conclusion, but it is an interesting one. By thinking about the respects in which James' human serpent is a temporal serpent – among other things, a structured, extended entity in spacetime, interacting with its surroundings – we can come to see why there is no part of our language and world view that escapes the mark of the snake.

Is there now a tension between James and Sellars? In other words, can global neo-pragmatists still represent their program in terms of Sellars' distinction between manifest and scientific images, or does that distinction depend on a pragmatism that shuts up shop when it gets to the investigation of science itself? This is a very nice question, to which I'll return briefly at the end of the chapter (§9). For now, let's take the first step on our stairway. It concerns 'now' itself, and its linguistic cousins.

3. Temporal indexicals

Indexicals are linguistic expressions whose reference shifts from utterance to utterance. 'I', 'here', 'now', 'he', 'she', and 'that' are classic examples of indexicals. Two people who utter a sentence containing an indexical may say different things, even if the sentence itself has a single linguistic meaning. For instance, the sentence 'I am female' has a single linguistic meaning, but Fred and Wilma say different things when they utter it, as shown by the fact that Fred says something false, while Wilma says something true. (Braun, 2017)

As these examples demonstrate, indexicality is far from exclusively a temporal matter. Within the temporal domain, it is involved in a wide range of expressions in addition to 'now' and its synonyms: terms such as 'yesterday', 'today', and 'tomorrow', for example, as well as the phenomenon of tense. All these expressions enable us to indicate the temporal location of something with respect to our own temporal location at the time of speaking. Other kinds of indexicals do a similar thing with respect to space, or personal identity.

What do indexicals have to do with neo-pragmatism? It is easy to answer this question with the recipe of the previous section in front of us. Imagine a different view, holding that when we talk of the *here* or the *now*, we are talking about distinctive features of the world, features whose nature a metaphysician might properly set out to investigate. That might seem a highly implausible view in the case of 'here', but it is familiar in the temporal case – as is an alternative, one that often compares 'now' with 'here', arguing that they should be understood in the same way. With the recipe in front of us, it is easy to see that this alternative counts as a case of neo-pragmatism. Here is Brandom, calling attention to most of the ingredients we need.

As a somewhat fanciful example, consider someone who is puzzled about what is represented by indexical ... vocabulary. Are there indexical ... *facts*, over and above those expressible in nonindexical terms? If not, why aren't indexical terms freely interchangeable with nonindexical ones (as [Perry's] essential indexical ... shows they are not)? If so, what are these peculiar items?

The fact that we can formulate rules sufficient to specify the correct use of indexicals (at least for ordinary, spatiotemporally located speakers) ... entirely in nonindexical terms should be enough to dispel any concern that there is something spooky or mysterious going on. ... If the practices themselves are all in order from a naturalistic point of view, any difficulties we might have in specifying the kind of things those engaged in the practices are talking about, how they are representing the world as being, ought to be laid at the feet of a Procrustean semantic paradigm that insists that the only model for understanding meaningfulness is a representational one. (Brandom 2013, 86–87)

As the work of Anscombe (1975), Perry (1979), Lewis (1979), Ismael (2007), and others has shown us, indexical beliefs have a distinctive *pragmatic* role. They connect to our practical life in particular ways, ways that any proposal to introduce 'indexical facts' would be obliged to explain. If there is a real 'now', for example, as some philosophers of time maintain, why should beliefs about it be relevant to action? Indeed, how would we *know* when the relevant fact obtained – 'How do we know it is now now?', as Braddon-Mitchell (2004) says.

These questions provide examples of what our third ingredient above termed the *Practical Relevance Constraint* – in my view, a very general and powerful piece of the neo-pragmatist machinery. The neo-pragmatist avoids such problems by *beginning* with the feature of speakers of immediate practical relevance, and building out from there. We will meet several more examples below. For *now*, as it were, the lesson we need is simply that a distinguished present moment is a central element in the manifest image of time, paradigmatically amenable to the neo-pragmatist machinery. That's our first step.

4. What makes time special?

Our second step generalizes the issue about time to which this familiar account of 'now' provides one part of the answer. Craig Callender (2017) puts the issue like this: What makes time *special*? In particular, what distinguishes time from space?³ Posed this way, the question certainly doesn't presuppose a neo-pragmatist answer, but it turns out to invite one. Much of what belongs to our ordinary view of time turns out to be best thought of as belonging to the manifest image of time, interpreted in neo-pragmatist terms.

What are the features of time in question? We have just observed that many writers have thought that one key distinction between time and space is that the world we inhabit requires a distinguished present moment, but no comparable distinguished place – an objective *now*, but not an objective *here*.

³ My usage here is slightly different from Callender's. He asks the question 'What makes time special?' after he has set aside what he takes to belong merely to the manifest image of time.

This view is typically linked to the claim that time is also distinguished in several other ways. It is said that time flows, or passes, in a way not true of space; that time has an intrinsic direction, again in a way not true of space; and the past and future are importantly different, the one fixed and the other open. These claims are not always well distinguished from each other, though in principle they are independent, to a large degree.

As a point of entry to these issues, let's begin with the passage from Arthur Eddington's *The Nature of the Physical World* in which the term 'Time's Arrow' makes its first appearance:

Time's Arrow. The great thing about time is that it goes on. But this is an aspect of it which the physicist sometimes seems inclined to neglect. In the four-dimensional world ... the events past and future lie spread out before us as in a map. The events are there in their proper spatial and temporal relation; but there is no indication that they undergo what has been described as "the formality of taking place" and the question of their doing or undoing does not arise. We see in the map the path from past to future or from future to past; but there is no signboard to indicate that it is a one-way street. Something must be added to the geometrical conceptions comprised in Minkowski's world before it becomes a complete picture of the world as we know it. (Eddington 1928, 34)

Here already we can distinguish two kinds of elements, both of which Eddington takes to be missing from Minkowski's four-dimensional picture of the world, in which time and space are treated in much the same way. One is what Eddington elsewhere calls 'happening', or 'becoming', or the 'dynamic' quality of time – the fact that time 'goes on', as he puts it in this passage. Time seems in *flux*, to use a much older term, in a way in which space is not, and Eddington is objecting that this aspect of time is missing from the four-dimensional picture.

The second missing ingredient – which Eddington himself doesn't distinguish from the dynamic aspect of time, but which is usefully treated as a distinct idea – is something to give a *direction* to the time axis in Minkowski's picture; something to distinguish past from future, as we might say.

The neo-pragmatist strategy is to explain all of these things as aspects of the manifest image, rather than the scientific image. This is most contentious, I think, in the case of the direction of time. In this case there is a strong tradition of writers who regard themselves as robustly scientific about time, who don't mess with presentness or passage, but believe in direction. (Earman 1974 is an example.) But I think even these folk would allow that some aspects of the intuitive distinction between past and future, such as the fixed past/open future contrast, is psychological in origin.

My own view is that direction, too, is a thoroughly perspectival matter. As Boltzmann put it in the 1890s: 'For the universe, the two directions of time are indistinguishable, just as in space there is no up and down.' (Boltzmann 1964, 447) Boltzmann was merely entertaining the possibility at that point, noting that it would be a natural thing to say in the context of a particular cosmological proposal, one he

credits to his assistant, a Dr Schuetz.⁴ However, the idea doesn't seem to have been proposed explicitly before this, which makes the remark a significant step in intellectual history – 'one of the keenest insights into the problem of time', as Reichebach (1956, 128) put it – and all the more so, of course, if the proposal turns out to be correct, as I think it does.

Indeed, in my view (see Price 2011b), it is very hard to make sense of *what it would be* for time to have an intrinsic direction, at least if we want to have some prospect of connecting that fact to our ordinary dealings with time, in physics and in ordinary life. In comparison, it is very easy to explain why temporally-oriented creatures such as ourselves – all of us, as it happens, sharing the *same* orientation – should come to think of this as an entirely objective feature of their environment, just as our ancestors did with up and down.⁵ Recognition of the perspectival element has its usual Copernican advantages, avoiding a need for structure *in the world* by explaining the appearance of structure as an artifact of our viewpoint.

As I say, this view about the direction of time is controversial.⁶ Not all writers on the topic, by any means, agree with me about the bleak prospects for non-perspectival accounts. I mention the case here with two lessons in mind. First, I think it provides a very clear idea of the *potential* of the general recipe – in particular, its potential for avoiding difficulties that arise when issues are addressed in other keys. Second, it illustrates some significant points about the contemporary philosophical landscape. In a case like this part of the argument for neo-pragmatism rests on criticism of rival approaches. These rival approaches are typically defended by writers who, as specialists in fields such as metaphysics and the philosophy of physics, are likely to have little familiarity with the ins and outs of neo-pragmatism. For their part, most neo-pragmatists will have little sense of the issues within metaphysics and philosophy of physics, and hence will be poorly placed to evaluate the potential advantages of their own methodology in

⁴ Boltzmann is considering the question why the entropy of our universe in the present era is so much lower than its maximum possible value (a circumstance that his own work can be argued to render extremely improbable). The suggestion he attributes to Schuetz is that if the universe is infinitely old, such low entropy phases are bound to occur occasionally, simply by chance. If we add that life such as ourselves could only exist in such a phase, there is no longer any mystery in what we observe. Boltzmann notes that such a random 'dip' in the entropy curve slopes upwards in both directions, away from the lowest point. If we add finally that our sense of past and future is linked to this entropy gradient, then we have Boltzmann's conclusion. Creatures on the two sides of the 'dip' will have different views about which direction is past and which future, with no objective sense in which one side gets it right and the other wrong. This is the analogy with up and down, assessed on opposite sides of the planet. (For details, see Price 1996, ch. 2, 2010, 2011b, and Barbour 2020a, 2020b.)

⁵ I'll say some more below (§9) about what our own temporal orientation involves. For the moment, let me emphasize that I am not suggesting that there is no objective temporal asymmetry at all, independently of our own temporal characteristics. On the contrary, there is at least the thermodynamic asymmetry that Boltzmann himself had in mind (cf. fn. 4). But important as this may be in explaining the existence of creatures such as ourselves, it turns out to be a poor candidate to provide a fundamental direction of time. One of the difficulties, as the Boltzmann-Schuetz hypothesis already recognises, is that like the gravitational field at a point on the Earth's surface, this asymmetry may turn out to be a local rather than a universal feature of our universe. (Again, for details see Price, 1996, ch. 2, 2011b.)

⁶ Though not as controversial as it may seem at first sight. Some writers who take there to be a direction of time are merely following Reichenbach (1956), in taking the phrase to refer to the temporal asymmetry described by the second law of thermodynamics (see, e.g., Rovelli 2022a). This is simply a terminological disagreement. These writers agree with me, and with Reichenbach himself, that there is no intrinsic direction *to time itself*. As I put it in (Price 1996), this view holds that the *contents* of the universe are temporally-asymmetric (at least in our region), but not that there is any asymmetry to the container itself, in its temporal aspect. Concerning the choice of terminology, I follow (Earman 1974), in thinking that anything worth calling a direction *of time* should be universal. Once again, there is no guarantee that this is true of the thermodynamic asymmetry, as the Boltzmann-Schuetz hypothesis recognizes (cf. fn. 5).

those fields. So the two sides tend to fail to engage – thereby missing, I think, important insights from both points of view.

Indeed, describing it as a matter of just two sides may be understating the degree of difficulty. From a neo-pragmatist perspective what needs to be explained is in large part the *psychology* of time. But here both sides in the philosophical debate tend to be under-equipped, to say the least. (There are some honorable exceptions, including Callender 2017.)

One writer who does seem to have appreciated the sense in which these become psychological questions is Ramsey. In the remarkable piece I mentioned earlier, one of the questions Ramsey touches on is the difference between past and future:⁷

It is, it seems, a fundamental fact that the future is due to the present ... but the past is not. What does this mean? It is not clear and, if we try to make it clear, it turns into nonsense or a definition. (GPC, 145)

Ramsey soon steers this towards a psychological question:

What then do we **believe** about the future that we do not believe about the past; the past, we think, is settled; if this means more than that it is past, it might mean that it is settled *for us*, ... that any present event is irrelevant to the probability for us of any past event. But that is plainly untrue. What is true is this, that any possible present volition of ours is (for us) irrelevant to any past event. To another (or to ourselves in the future) it can serve as a sign of the past, but to us now what we do affects only the probability of the future.

This seems to me the root of the matter; that I cannot affect the past, is a way of saying something quite clearly true about my degrees of belief. (GPC, 146, bold emphasis added)

As we shall see, Ramsey's point turns on the fact that for the agent herself, whether she acts a certain way is not an epistemic matter – 'not ... an intellectual problem'. (GPC, 142) 'In a sense', as Ramsey puts it, 'my present action is an ultimate and the only ultimate contingency.' (GPC, 146)

For the present, what matters is the stance that Ramsey's view embodies. He is explaining what we take to be a fundamental difference between past and future as a manifestation of the epistemic perspective of a deliberating agent. It is a classic example of a neo-pragmatist alternative to what other approaches treat as a metaphysical issue. Moreover, it occurs in passages in which Ramsey is explicit in adopting the same stance with respect to causality. This brings us to our next step.

⁷ As I note in (Price 2022a), Ramsey may have got this puzzle from Eddington. Eddington's book *The Nature of the Physical World* was published in November 1928, and was soon a bestseller, reprinted several times by the summer of 1929. Ramsey certainly read it; his notes survive among his papers. Eddington (1928, ch. 14) discusses causation and the apparent difference between past and future, including the puzzle why causation seems to work only in one direction (even though the underlying physics is time-symmetric). Eddington doesn't have a solution, but he ventures two possible approaches. Ramsey's phrasing in GPC suggests that he is briskly dismissing one, while putting his finger on the crucial element needed for the other. See (Price 2022c) for further details.

5. The temporal modalities: probability and causation

At the previous step we were concerned with neo-pragmatist approaches to the manifest image of time. We now turn to what we might call the temporal or time-laden modal categories of causation and probability. The neo-pragmatist again treats these, as Ramsey says, as questions for psychology. The project is to explain them as useful cognitive architecture for non-omniscient agents, burdened with a concern for their own future.

Ramsey's neo-pragmatism about both probability and causation amounts to the view that a philosophical account of either topic needs to begin with the psychology of choice. The difference between probability and causation turns mainly on the fact that it makes a difference to a decision maker whether she takes herself to be able to act in the world, able to fix the value of certain variables at will. That's where causal thinking comes in. As Ramsey puts it, 'from the situation when we are deliberating seems to me to arise the general difference of cause and effect.' (GPC, 146)

5.1 Practical Relevance for probability

Ramsey is well-known as one of the founders of so-called *subjectivism* about probability. We need to be careful with this term. Subjectivism about probability is sometimes characterized as the view that probabilities *are* degrees of belief. That should be seen as a mistake, in my view, by neo-pragmatist lights. Neo-pragmatism isn't interested in the *metaphysical* question as to what probabilities *are*, but in the *psychological* question as to why creatures like us think in those terms – and that's where the degrees of belief come in. Of course, this is only the beginning, and the neo-pragmatist's goal should be to elaborate from this starting point into a theory for why we model the world in terms of probabilities, or chances, which look for many purposes like 'regular' objective features of reality.

When the view is developed in this way the subjectivism becomes more subtle. We can no longer say simply that probabilistic claims are *about* our degrees of belief. A good way to keep the central issue in view is to focus on the Practical Relevance Constraint. As in other cases, we can highlight the issue by asking the *Euthyphro* question. Is it the fact that there is a high probability, or chance, that P that makes it reasonable to hold a high degree of confidence that P (and act accordingly, in choice of betting odds)? Or is the meaning of the claim that there is a high probability that P somehow *constituted by*, or *grounded in*, the psychological state of being confident that P. These options may reasonably be termed *objectivism* and *subjectivism*, respectively.

I have phrased the Practical Relevance issue this way to connect to some important discussions in the metaphysics of chance and probability, where writers sympathetic to objectivism have recognised the importance of subjectivist insights. One such writer is D H Mellor (1971), who defends a version of what we are here calling the subjectivist option, calling it 'personalism'. Following (Kneale 1949), Mellor insists that personalism is compatible with the view that chances are real and objective – it is just that in saying what they are, we need to begin with rational degrees of belief, or credences.

[C]an we not analyse full belief that the chance of heads on a coin toss is 1/2 without reference to some supposedly corresponding partial belief that the coin will land heads? The reason for

denying this is the fact to which Kneale himself draws attention (p. 18) ‘that knowledge of probability relations is important chiefly for its bearing on action’. It follows as Kneale says (p. 20) that ‘no analysis of the probability relation can be accepted as adequate ... unless it enables us to understand why it is rational to take as a basis for action a proposition which stands in that relation to the evidence at our disposal’. Similarly with chance. It must follow from our account that the greater the known chance of an event the more reasonable it is to act as if it will occur. This concept of a quantitative tendency to action is just that of partial belief [i.e., credence] as it has been developed by the personalists. It is thus available to provide in our account of chance that necessary connection with action on which Kneale rightly insists. *A great difficulty facing other objective accounts of chance, notably the frequency theories, has been to build such a connection subsequently on their entirely impersonal foundations.*⁸ (Mellor 1971, 3, emphasis added)

Kneale’s point, too, can be traced back to Ramsey. As Misak has recently pointed out, one of Ramsey’s objections to Keynes’ theory of probability as a logical relation is that such relations ‘would stand in such strange correspondence with degrees of belief’ (Misak 2020, 144, quoting from notes by Ramsey), and hence with betting behavior. In other words, Keynes leaves it mysterious why probability should *matter* in the way that it obviously does.

Lewis (1980) also defends a form of subjectivism. Like Mellor, he takes chance to be objective, but takes it to be definitive of chance that it plays a distinctive role in guiding credence. As he says, he is ‘led to wonder whether anyone *but* a subjectivist is in a position to understand objective chance!’ (1980, 84). Returning to this theme in later work, he criticizes rival approaches on the grounds that they pay insufficient attention to this connection between chance and credence: ‘Don’t call any alleged feature of reality “chance” unless you’ve already shown that you have something, knowledge of which could constrain rational credence,’ he says (1994, 484).⁹

⁸ In later work, Mellor makes other moves that seem to me to suggest neo-pragmatism about chance. He says that the reason ‘it has proved so hard to frame an acceptable account of objective chance’ is that ‘people naturally feel that, if chance is objective, it must make true beliefs with some characteristic content, ... supposing that the only objectifying job facts can have to do is making beliefs true.’ (Mellor, 1982, 247) As I noted in (Price 1981, 5:17–18, 6:15), this is strikingly similar to Toulmin’s view that ‘there is no special “thing” which all probability-statements must be about, simply in virtue of the fact that they *are* “probability-statements”’ (Toulmin 1950, 50). And Toulmin links it explicitly to what would once have been called a non-cognitivist account of probability judgments. In Toulmin’s view, ‘to say “Probably p” is to assert, guardedly and/or ... with reservations, that *p*’ (1950, 61). In (Price 1981) – my Cambridge PhD thesis, written under Mellor’s supervision – I was citing Toulmin as an ally for my own proposed ‘non-truthconditional’ account of probability claims (i.e., what I would now call a neo-pragmatist or expressivist account).

⁹ It is worth quoting the full passage in which Lewis makes this remark:

Be my guest—posit all the primitive unHumean whatnots you like. ... But play fair in naming your whatnots. Don’t call any alleged feature of reality ‘chance’ unless you’ve already shown that you have something, knowledge of which could constrain rational credence. I think I see, dimly but well enough, how knowledge of frequencies and symmetries and best systems could constrain rational credence. I don’t begin to see, for instance, how knowledge that two universals stand in a certain special relation N* could constrain rational credence about the future coinstantiation of those universals. (Lewis 1994, 484)

5.2 Practical Relevance for causation

In the case of causation, however, the parallel point is far less well known. Everyone agrees that causality and rational means–end deliberation go hand-in-hand, in normal circumstances. Putting it roughly, A causes B if and only if, other things being equal, it would be rational for an agent who desired B to *do* or *bring about* A, in order to realize B. Again we can ask the *Euthyphro* question. Is it the causal connection between A and B that makes it rational to do A to achieve B? Or is the meaning of the claim that A causes B somehow *constituted by* or *grounded in* the psychology of agency? As the probability case, let's call the first option the objectivist view, the second the subjectivist view.

In this case, it is hard to find the equivalents of Mellor and Lewis – leading metaphysicians of causation who recognise the need to build its practical face in from the beginning.¹⁰ On the contrary, two influential arguments have seemed to many writers not only to mandate the objectivist view, but to do so on the basis of the intuitive connections between causation and rational decision. In our present terminology, both can be read as attempts to use the Practical Relevance Constraint *against* subjectivism and neo-pragmatism.

One of these arguments is Nancy Cartwright's famous (1979) claim that realism about causation is required to ground the distinction between effective and ineffective strategies – e.g., to explain why moving a barometer needle is an ineffective strategy for controlling the weather, despite the correlation between the two. Cartwright argues that it is an objective matter which strategies are effective and which ineffective. Such an objective matter calls for explanation, one that it seems that laws of association simply cannot provide. Hence, Cartwright concludes:

[C]ausal laws cannot be done away with, for they are needed to ground the distinction between effective strategies and ineffective ones. ... [T]he difference between the two depends on the causal laws of our universe, and on nothing weaker. (1979, 420)

The second argument arose from the literature concerning so-called Newcomb problems (Nozick 1969). These are decision problems that seemed to some writers to provide *counterexamples* to the usual association between causation and rational means–end reasoning – in other words, cases in which it makes sense to do A because A provides strong *evidence* for a favorable outcome B, without being a cause of B. 'Evidentialists' try to make the case for such counterexamples, while 'Causalists' oppose it. The two sides thus disagree what the rational choice is in Newcomb problems, with Causalists insisting that it is determined by the causal facts of the situation. In this way, they commit themselves implicitly to the objectivist answer to the *Euthyphro* question. For the subjectivist, after all, the causal facts could not be settled in advance of the question about rational choice, in difficult cases.

In my view, both of these influential arguments – Cartwright's argument, and the Causalist case in Newcomb problems – are vulnerable to the neo-pragmatist's usual Practical Relevance challenge. In both cases, the neo-pragmatist can point out that objectivism simply leaves it mysterious why causation

¹⁰ We do find it in the work of Pearl (2000) and Woodward (2003), but even here it comes from a computer scientist and a philosopher of science, respectively.

should *matter* to rational decision, in the way that it is crucial to both arguments to claim that it does.¹¹ Subjectivism can do much better, for a reason that depends on another of Ramsey's insights in GPC. For the response to Cartwright, the crucial point is that evidential dependencies are *different* from an agent's perspective, as she considers possible actions, than they are from a third-person perspective. As Ramsey puts it in the passage I quoted above:

What is true is this, that any possible present volition of ours is (for us) irrelevant to any past event. To another (or to ourselves in the future) it can serve as a sign of the past, but to us now what we do affects only the probability of the future. (GPC, 145)

(After that we get the remark that 'my present action is an ultimate and the only ultimate contingency.')

What does Ramsey have in mind here? I think it is what has since become known as the thesis that *deliberation crowds out prediction* (DCOP). As Isaac Levi puts it, 'deliberation crowds out prediction so that a decision maker may not coherently assign unconditional probabilities to the propositions he judges optional for him' (Levi 2000, 394). DCOP implies that from an agent's point of view, a contemplated action must be regarded as probabilistically independent of anything to which she does assign an unconditional credence, even if *other people* (or she herself *at other times*) could legitimately take something of that kind as evidence about her choice, or *vice versa*. This independence *from the agent's point of view* is what Ramsey means by 'ultimate contingency', in my view.

For present purposes, the crucial point is that probabilities assessed from the first-person, present-tensed perspective of a deliberating agent, are legitimately *different* from those assessed from the standpoint of 'another (or ... ourselves in the future)', as Ramsey himself puts it. In particular, this means that these agent-probabilities can ignore some of the correlation-based evidential dependencies that Cartwright rightly takes to play havoc with the distinction between effective and ineffective strategies.¹² *Pace* Cartwright, we get to this distinction not by *adding* causal laws to bare associations in the ontological realm, but by *taking something away* from the import of those associations in the epistemic realm. Ramsey's great insight is to see how deliberation does the subtraction for us.

So long as causal subjectivism is grounded on Ramsey's insight, then, it can explain the distinction on which Cartwright's argument relies between effective and ineffective strategies, the former tracking probabilistic relevance *from the agent's point of view*. In a similar way, I think, it can draw a plausible line through the forest of Newcomb-like problems, avoiding the sins of which Evidentialists are normally accused. (See Price 1986, 1991, 2012, 2023, ch. 12; Price and Liu 2018.)

¹¹ I develop this argument in Price and Liu (2018).

¹² Ramsey's formulation of the point can be improved in two respects, I think. First, it is not only past events with respect to which deliberation breaks evidential dependencies. If I am deliberating about whether to move the needle of my barometer, I should not take my choice to provide evidence about present or future weather, or vice versa. Second, a minor point here, Ramsey has not given us a reason to be sure that *everything* in the past is off limits in this way. As I have argued elsewhere, the possibility that some of it is not turns out to be interesting in making sense of quantum theory (see Price 1996, Price and Wharton 2015, for this 'retrocausal' proposal).

5.3 Explaining the temporal character of causation and chance

Closer to our current concerns, I have also argued (Price 1996, Price 2007, Price and Weslake 2010) that the neo-pragmatist approach provides the most satisfactory account of the *temporal* characteristics of the causal relation – in particular, the fact that the causal ‘arrow’ has such a striking temporal orientation. Here there are actually two things to be explained. The first is the difference between cause and effect – without such a difference, there could be no arrow in the first place. The second is the temporal component of the puzzle, the fact that causes typically *precede* their effects. Once again, the explanation follows Ramsey. Roughly speaking, causes are variables thought of as under the control of an (often highly idealized) deliberating agent, and effects are variables correlated with these controlled variables in such a way the correlation survives, when the other variable is brought about by an agent in this way.

If we imagine a simple example, it will be easy to see how the typical temporal orientation of the cause–effect relation reflects that of the agents concerned, for an approach of this sort. Let’s begin with an observed Humean regularity of a familiar kind, say between dropped plates (DP) and mess on the floor (MF) soon afterwards, in our campus cafeteria. Does DP cause MF, does MF cause DP, or does neither relation obtain?

To settle the issue, Ramsey’s approach requires us to consider the cases in which a deliberating agent *chooses* to produce DP, and *chooses* to produce MF. Given our temporal orientation as agents, this involves putting ourselves into the picture *before* the variable in question, in each case. Keep a close eye on this fact, because it, and nowhere else, is where the time asymmetry gets into the account. When we put ourselves into the picture before DP – i.e., as we would ordinarily say, when we choose to drop a plate – a mess on the floor soon afterwards is a reliable co-occurrence. So the DP-MF correlation continues to hold, in this case, and we conclude that dropping plates does *cause* messy floors (at least in the circumstances that normally obtain in our campus cafeteria).

What about when we choose to produce MF directly? In this case, we are considering instances in which what lies in the immediate *past* of MF – again, it has to be the past, given our own temporal orientation as agents – is our own action, messing the floor in some way. (We might throw down a handful of peas and some broken china, for example.) In these cases, there is no guarantee whatsoever that MF is preceded by DP. Our *intervention* breaks the normal DP-MF correlation.¹³ So making the floor messy is not a cause of just-dropped plates, despite the observed correlation between these things in normal circumstances.¹⁴

This is a textbook example of the neo-pragmatist direction of explanation. The character of the manifest image reflects the contingencies of our own nature and viewpoint. In particular, the temporal character of the causal relation reflects the temporal orientation of agents like us, not the other way round.

¹³ I use the term ‘intervention’ deliberately here, though it is given a somewhat more precise sense in so-called interventionist approaches to causation (e.g., that of Woodward 2003). My view is that such approaches cannot account for the ordinary time-orientation of causation unless they retain this link to our de facto temporal orientation as agents; see (Price 2017) for discussion.

¹⁴ Things become more complicated when the correlations in question involve features of ourselves, as in the so-called medical Newcomb problems. See (Price 1986, 1991) for my proposed treatment of those cases.

Similar temporal questions arise in the case of chance. Typically a theory of chance is taken to tell us the chance of a *future* event, given a *past* history. Where does that temporal direction come from? A pragmatist will say that it reflects our own epistemic orientation. In crucial respects, we often have less information about the future than the past, and yet we care about the future. As we would ordinarily put it, our welfare often depends on what happens to us in the future.¹⁵ A time-directed theory of chance is a rule book for an ideal agent of this kind, who knows everything about the past but nothing, except via such a theory, about the future. (Similar remarks apply to the apparent direction of causality, only here the temporal orientation of agency is also relevant. Indeed, one of the reasons we often know little about highly relevant bits of the future is that we haven't yet decided what to do!¹⁶)

5.4 *Confronting objectivism*

This asymmetry of epistemic and agentive perspective can be deeply embedded in a theoretical description, and it takes work to dig it out. When a pragmatist does dig it out, they are liable to be accused of denying the reality of something obviously real, such as objective chance and objective causation. They should persist, of course, and press home two advantages. As we have seen, one advantage stems from the Practical Relevance Constraint. The neo-pragmatist is uniquely well-placed to explain why probability and causation *matter* in the way that they do – why they properly play a characteristic role in rational decision. This is where neo-pragmatism begins, in these cases.

The second advantage exploits the perspectival character of neo-pragmatism – its Copernican face. We can often highlight the perspectival character of a term or concept by pointing out that we can make sense of creatures who, in virtue of having a different perspective from ours, would apply the term differently, or not have a use for it at all. In this way, neo-pragmatism can undermine the assumption that categories such as probability and causation are simply part of the furniture, to be studied like mass or charge.

The most dramatic of these alternative perspectives are those that imagine creatures with the opposite temporal orientation to ours. I have in mind the Boltzmann-Schuetz proposal, and its contemporary cousins: in other words, cosmological proposals that allow regions of the universe in which the gradient associated with the second law of thermodynamics is reversed relative to that in our own region. As we noted in §4, it is plausible that intelligent creatures in such regions would have the opposite view to us as to which temporal direction is past and which future. We are now extending that thought to their notions of chance and causation.¹⁷

¹⁵ I put this seemingly obvious point in this careful way in order to return (in §9) to the point that this is something that a pragmatist should not merely take for granted, but rather highlight it as the contingent pragmatic grounds of much of our thought and linguistic practice.

¹⁶ Choice is an epistemic 'wild card', as Ismael (2011, 161) puts it.

¹⁷ See (Price 1996, 2007; Price & Weslake 2010) for discussion. For both probability and causation, it is also possible to find much more familiar variations in the standpoints of different speakers, sometimes within the same conversation. In the case of probability, two speakers may have access to different bodies of evidence. In the case of causation, they may be treating different things as 'background conditions', and hence drawing different conclusions as to what should be counted as the cause of a given event. A further advantage of neo-pragmatism is that it accommodates such cases smoothly, and doesn't require an abrupt discontinuity between these cases and talk of 'real', 'objective', probability and causation.

In debates of this kind a neo-pragmatist's opponents will often include philosophers who regard themselves as committed realists about science (especially physics), and who regard realism about probability and causation as part of the same package. But there are allies of pragmatism within philosophy of science, and even within philosophy of physics. For the benefit of neo-pragmatist readers I am pleased to call attention to recent work on avowedly pragmatist philosophies of quantum theory. I'm thinking particularly of the work of Healey (2017), though the so-called QBist or Quantum Bayesian approach (Timpson 2008) also acknowledges its inspiration from pragmatism and probabilistic subjectivism. Motivated by the puzzles of quantum theory, these views have come from a very different direction than neo-pragmatism to the conclusion that some fundamental physics is not to be understood as offering bare representations of independent reality. Instead, these views take quantum theory to embody the perspective of idealized observers and experimenters – idealized versions of contingent creatures like us.

Welcome as these allies are for a neo-pragmatist, they need to be embraced with a caveat. It is possible to read these views as *contrasting* quantum theory with other parts of science, and with the descriptions we employ in ordinary life. On such a contrastive view, pragmatism would be a local view in science, applicable where ordinary modes of description fail us. Pushing back against that localism leads us to our next step.

6. A world of dispositions

It has often been proposed that many, if not all, of the fundamental properties ascribed in physics – charge, mass, and the like – are *dispositions*. What is a disposition?

Dispositions are, at first pass, those properties picked out by predicates like 'is fragile' or 'is soluble', or alternatively by sentences of the form 'x is disposed to break when struck' or 'x is disposed to dissolve when placed in water.' Dispositions so understood have figured centrally in the metaphysics and philosophy of science of the last century (Carnap 1936 & 1937, Goodman 1954), and also in influential accounts of the mind (Ryle 1949). (Maier, 2020)

The term 'disposition' is to some extent a piece of philosophers' jargon, aiming to nail-down a meaning shared (at least in part) by many other ordinary and philosophical terms:

Many terms have been used to describe what we mean by dispositions: 'power' (Locke's term), 'dunamis' (Aristotle's term), 'ability', 'potency', 'capability', 'tendency', 'potentiality', 'proclivity', 'capacity', and so forth. In a very general sense, they mean disposition, or otherwise something close by. (Choi and Fara, 2021)

The claim that the fundamental properties of physics are dispositions is closely linked to empiricism. The thought is that we have no direct access to the intrinsic nature of the physical world, but know it only

indirectly, via its tendencies to affect our measuring devices. This thought in itself is easy to give a pragmatist flavor: we know the world through its practical effects. But my interest lies a step further back.

In asserting a dispositional property of an object – whether in physics or in more familiar domains – we commit ourselves to an *expectation* about how the object would behave, in certain circumstances. Expectation is a psychological notion. Where should we look for an account of the psychological relevance of dispositional properties? This is simply another case of the Practical Relevance issue, discussed above with respect to probability and causation.

As in those cases, we can distinguish two approaches, linked to the two possible answers to the *Euthyphro* question. The metaphysical approach takes on board the task of explaining the psychological relevance in terms of the nature of dispositions. The pragmatist approach begins at the other end, saying that we develop these descriptions because they are the kind we need, as epistemically limited creatures, acting for the sake of our future welfare. The expectational character of the manifest image is grounded in our own psychology and temporal character.

For present purposes, the point I want to emphasize is that neo-pragmatism about dispositions greatly broadens the relevance of the human temporal perspective. The previous step took us to its relevance to particular concepts, such as probability and causation. This step takes us to a very broad class of properties indeed – arguably, in fact, all of them. We need to move quickly, so I want simply to mark four philosophical waypoints that I think can be seen to be in the spirit of this sort of neo-pragmatist perspective on dispositions. Together, they will take us much further in the direction of globalism.

6.1 Hume on causal necessity

The first and most obvious waypoint is Hume. This talk of expectation calls to mind the interpretation of Hume according to which he takes talk of causation to be a ‘projection’ of the expectations to which observed regularities give rise.

Hume locates the source of the idea of necessary connection *in us*, not in the objects themselves or even in our ideas of those objects we regard as causes and effects. In doing so, he completely changes the course of the causation debate, reversing what everyone else thought about the idea of necessary connection. (Morris and Brown, 2021)

If we read Hume as a proto-neo-pragmatist about causation, then the points we have just made can be put by saying that the same expectation-grounded neo-pragmatism seems to fit our talk of dispositions, not just our talk of causation.

6.2 Wittgenstein on the hypothetical character of language

For a second waypoint I’ll turn to some little-known remarks of Wittgenstein, delivered in a lecture in Cambridge in January 1930. Both Mathieu Marion (2012) and Anna Boncompagni (2017) have noted the relevance of these remarks to the question of pragmatist influences on Wittgenstein.

When I say ‘There is a chair over there’, this sentence refers to a series of expectations. I believe I could go there, perceive the chair and sit on it, I believe it is made of wood and I expect it to have a certain hardness, inflammability etc. If some of these expectations are mistaken, I will see it as proof for retaining that there was no chair there. (Wittgenstein 1930)

These remarks occur in a context in which Wittgenstein is interested in a contrast between the language of ordinary life and the (supposed) primary language of immediate perceptions. They link to reasons Wittgenstein offers for being skeptical of the possibility of such a primary language.

Every sentence we utter in everyday life appears to have the character of a hypothesis.

A hypothesis is a logical structure. That is, a symbol for which certain rules of representation hold.

The point of talking of sense data and immediate experience is that we are looking for a non-hypothetical representation.

But now it seems that the representation loses all its value if the hypothetical element is dropped, because then the proposition does not point to the future any more, but it is, as it were, self-satisfied and hence without any value. (Wittgenstein 1930)

As Marion and Boncompagni both point out, it is very likely that Wittgenstein was influenced by Ramsey at these points. It is easy to link these remarks to the themes of GPC, written just a few months previously. In GPC, as we saw, Ramsey’s initial concern is with the status of lawlike and unrestricted generalizations, such as ‘All men are mortal’ – what Ramsey calls ‘variable hypotheticals’. Contrary to his previous view that these should be construed as infinite conjunctions, Ramsey now argues that they are not propositions at all. As Ramsey puts it, such a generalization is ‘not a judgment but a rule for judging’. Rules like this ‘form the system with which the speaker meets the future’.

Wittgenstein’s remarks can be seen as extending such a perspective to ordinary notions such as *chair*, an extension to which Ramsey would surely have been sympathetic. Again, the pragmatist view is that such property ascriptions support expectations *because expectations are built in from the very beginning*.

Marion puts the point like this, introducing some terminology I want to appropriate for our present purposes:

Ramsey introduced his notion of ‘variable hypothetical’ as a rule, not a proposition, on pragmatist grounds and ... Wittgenstein picked this up in 1929, along with a more ‘dynamic’ view of meaning than the ‘static’ view of the *Tractatus*, and ... this explains in part Wittgenstein’s turn to his ‘later philosophy.’ (Marion 2012, 26)

A large part of my message in this chapter is that the dynamic, temporal quality of human thought goes at the centre of everything (and that this is a profoundly pragmatist message).

6.3 Ryle on inference tickets

Our third waypoint takes us to Oxford, twenty years later. It is Ryle's view of conditionals and dispositions. As Alexander Bird describes Ryle's view:

[T]he sentence "this lump of sugar would dissolve if placed in water" does not assert some factual truth, such as the attribution of a property to a thing. Rather, along with law-statements, such assertions must be understood as inference-tickets: one is entitled to infer from "this lump of sugar is in water" to "this lump of sugar is dissolving." In effect the modal feature of dispositions is located in the inference ticket. Ryle does not tell us what features of the world entitles us to employ such an inference ticket. (Bird 2012, 733)

Against the background of the Ramsey–Wittgenstein view above, Bird's last remark here invites the thought that by Cambridge lights, it might be inference-tickets all the way down. All belief is a matter of dynamic habit, not static picturing. This doesn't seem very far from global inference-tickets.¹⁸

Bird notes that both Ryle and Thomas Storer make the link between dispositions and counterfactuals:

Ryle (1949: 123) asserts that, "To say that this lump of sugar is soluble is to say that it would dissolve, if submerged anywhere, at any time and in any parcel of water." Storer (1951: 134) says concerning definitions of dispositional concepts (such as colour predicates):

The peculiarity of all such definitions is the occurrence of sentences of the type: "If so and so *were to happen*, then such and such *would be the case*". In a current phrase, all definitions of dispositional predicates involve the use of contrary to fact conditionals.

So both Ryle and Storer recognize the connection between dispositions and counterfactuals, but retreat from making much of this connection when giving further detail, primarily because of empiricist concerns at the metaphysical implications of taking counterfactuals at face value. (Bird 2012, 732–733)

Bird also mentions the view of Sellars (1958), in our terms another proto-neo-pragmatist, on whom more in a moment. Bird then summarizes the mid-century landscape:

¹⁸ It is a familiar idea that Ryle might owe some unacknowledged debt to Wittgenstein. In recent work, Cheryl Misak makes a strong case that this gets both the source and the path of the influence wrong. Ryle's biggest unacknowledged debt is to the work of his friend Margaret Macdonald in the 1930s, and through her work to Ramsey and to Peirce. As Misak puts it, 'Ryle owes his central ideas to pragmatism. He helped himself to the underappreciated Margaret MacDonald's reading of Peirce and Ramsey—to the distinction between knowing how and knowing that and the idea that laws are inference tickets.' (Misak, forthcoming, 1)

The position in the 1950s was that philosophers recognized that dispositional and counterfactual assertions are related and that both of these have connections with statements concerning laws and causes. Goodman (1954) distinguished the analysis of counterfactuals from analyzing the meaning of law statements. On the other hand, by his own admission, Goodman was unable to articulate the details of their relationship. Furthermore, he remained committed to a Humean view of laws that distinguishes them from other regularities only in virtue of our propensity to use them in inferences and predictions (cf. the Rylean inference ticket view of dispositions and laws mentioned above). (734)

As Bird goes on to say, however, the field took a very different turn in the following decades:

The discussion of the analysis of dispositions was given a major impetus by the development of a semantics for counterfactuals by Stalnaker (1968) and Lewis (1973), following earlier work by Kripke on semantics for modal logic. The semantics provided for counterfactuals made them philosophically respectable, while also articulating their problematic relationship with laws. Lewis also provided an account of causation in terms of counterfactuals, allowing a further dissociation of counterfactuals, laws, and causes. (734)

It is fair to say that with this shift, the neo-pragmatist perspective on dispositions becomes very deeply submerged. To bring it to the surface we need to tackle a bigger opponent. In my view the appropriate way to do this is to press the Practical Relevance challenge against talk of possible worlds, whether in Lewis's form or otherwise – to argue that unless an account of *them* begins with the epistemic and agential perspective of creatures like ourselves, it will find it itself unable to put them in later, except by fiat.¹⁹

I have explored some aspects of this challenge in work mentioned in the previous section, concerning the practical utility and temporal orientation of causation. Similar remarks will apply to the time-asymmetry of counterfactuals, in terms of which Lewis seeks to explain that of causation. Another aspect of this challenge – presently rather under-explored, so far as I know – might build on Kripke's famous challenge to Lewis's account of transworld personal identity. Why should Hubert Humphrey care that his counterpart in some other possible world – according to Lewis's view an entirely different person, in a region of reality entirely disconnected from ours – won the presidential election?²⁰ Again, neo-pragmatism seems likely to have the upper hand.

¹⁹ The same kind of fiat as is involved in treating the relation between chance and rational credence as a primitive fact, requiring no explanation – a move to which, as we saw, Lewis himself is opposed.

²⁰ Varzi (2020) describes Kripke's point like this:

Someone other than Humphrey enters into the story of how it is that Humphrey might have won the election. Saul Kripke famously complained that this is bizarre: "Probably, Humphrey could not care less whether someone *else*, no matter how much resembling him, would have been victorious in another possible world" (1972, p.344, n.13)

6.4 The Kant–Sellars–Brandom thesis

Interesting as those issues are from a neo-pragmatist perspective, I want to keep our focus on the broader message: the dynamic, temporal character of (at least much of) conceptual thought. Our final waypoint is Brandom’s Sellarsian inferentialism. Here is Brandom on the history of these ideas.

Kant was struck by the fact that the essence of the Newtonian concept of mass is of something that, by law, *force* is both necessary and sufficient to *accelerate*. And he saw that all empirical concepts are like their refined descendants in the mathematized natural sciences in this respect: their application implicitly involves counterfactual-supporting dispositional commitments to what *would* happen *if*. Kant's claim, put in more contemporary terms, is that an integral part of what one is committed to in applying any determinate concept in empirical circumstances is drawing a distinction between counterfactual differences in circumstances that *would* and those that *would not* affect the truth of the judgment one is making. One has not grasped the concept cat unless one knows that it would still be possible for the cat to be on the mat if the lighting had been slightly different, but not if all life on earth had been extinguished by an asteroid-strike.

In an autobiographical sketch, Sellars dates his break with traditional empiricism to his Oxford days in the 1930s. It was, he says, prompted by concern with the sort of content that ought to be associated with logical, causal, and deontological modalities. Already at that point he had the idea that

what was needed was a functional theory of concepts which would make their role in reasoning, rather than supposed origin in experience, their primary feature. [Sellars 1975, 285]

Somewhat more specifically, he sees modal locutions as tools used in the enterprise of making explicit the rules we have adopted for thought and action.

. . . I shall be interpreting our judgments to the effect that A causally necessitates B as the expression of a rule governing our use of the terms ‘A’ and ‘B’. [Sellars 1949, 136, fn. 2]

In fact, following Ryle, he takes modal expressions to function as *inference licenses*, expressing our commitment to the goodness of counterfactually robust inferences from necessitating to necessitated conditions. If and insofar as it could be established that their involvement in such counterfactually robust inferences is essential to the *contents* of ordinary empirical concepts, then what is made explicit by modal vocabulary is implicit in the use of any such concepts. That is the claim I am calling the “Kant-Sellars thesis.” (Brandom 2008, 97–98)

For the present, what matters about this are two things. First, the Kant-Sellars thesis puts the dynamical character of dispositional concepts at the core of all empirical concepts whatsoever. Second, it replaces the bare Humean *habitual* conception of the dynamical relations involved with a *normative* one. Concepts are to be understood in terms of their role in the dynamic behavior of norm-governed inference-engines.

6.5 Summary

We have been moving at pace through a landscape with one central theme. A major part (at least) of the category of properties we ascribe to the world, and of our system of empirical concepts as a whole, have a strong claim to reflect the dynamic, serial character of human thought – in particular, our striving to prepare for an uncertain future. In this way our own temporal character is reflected not only in the nature of conceptual thought itself, but in our image of the world we inhabit, both in science and in everyday life. Once again, I want to urge that these are pragmatist lessons. Specifically, they are pragmatist lessons that require that we reflect, as pragmatists, on our own (contingent?) natures as physical entities of a particular kind – processes embodied in time.

I qualify the claim about contingency here because in this case it isn't easy to make the move so useful elsewhere in the neo-pragmatist program, of imagining ourselves otherwise, and asking how things would seem from that alternative perspective. It is far from clear that we can imagine an intelligence that isn't temporal in a similar way. More on this in §8 below. But I don't think this imaginative roadblock is an obstacle to the pragmatist conclusion I want to extend to this point. Here, as in easier, more local cases, we need to understand what we *are*, in order to understand what we think, what we say, and how we describe our world.

Before we move on, I want to address a concern that will have occurred to sharp-eyed readers. In §4 I associated neo-pragmatism with the view that many of the apparent differences between time and space are manifestations of the human perspective. This viewpoint is often linked to so-called 'static' or 'block universe' conceptions of time, conceptions opposed to 'dynamic' views of time, that take time to be more radically different from space.²¹ So I may seem to have put myself in a difficult position. On the one hand I am opposing the dynamic conception of time. On the other hand I am giving a central role to the dynamic, serial character of human thought. Isn't there a tension here?²²

It is a reasonable concern, but the answer we need is in D C Williams' classic manifesto for the block universe picture, 'The Myth of Passage' (Williams 1951). Williams calls the block universe the *manifold*, and here he is responding to the challenge that such a picture cannot make sense of change:

Let us hug to us as closely as we like that there is real succession, that rivers flow and winds blow, that things burn and burst, that men strive and guess and die. All this is the concrete stuff of the manifold, the reality of serial happening, one event after another, in exactly the time spread which we have been at pains to diagram. What does the theory allege except what we find, and what do we find that is not accepted and asserted by the theory? (Williams 1951, 467)

²¹ As every proponent of the view is well aware, the term 'static' is merely a metaphor. There is not thought to be some external time, outside the block, in which the block itself is unchanging.

²² A different challenge at this point would be that I seem to be favoring one *metaphysical* view of time over another; and as a neo-pragmatist, what business do I have in messing with such metaphysical questions, let alone in picking sides? My answer is that by my lights, the issue here isn't metaphysics, but simply physics. What do we need in the physics of time, to explain the appearances? I say we just need the block. Remember Copernicus – he's doing physics, and what we might call phenomenology, but not metaphysics. Cf. §9.

The message of this section, indeed of the chapter as a whole, is that neo-pragmatists need to pay close attention to the fact that we humans 'strive and guess and die', and related aspects of the kinds of beings that we are, stretched out across the manifold. This is what I have been calling our dynamic, serial character. I cannot put more eloquently than Williams the conclusion that this doesn't require that we burden ourselves with some additional metaphysics of change or passage, in addition to the 'reality of serial happening'.

7. Signs and dispositional triggers

In the previous section we considered dispositional properties, and empirical concepts on the Kant-Sellars-Brandom model, as tools adapted for temporal creatures like us. I now want to observe that a similar point can be made about any symbolic language. Language 'points to the future', in Wittgenstein's phrase, not merely in the sense Wittgenstein has in mind here: 'When I say "There is a chair over there", this sentence refers to a series of expectations.' It also points to the future in the sense in which any linguistic sign is a gift to the future – a nut added to a store for the winter. Such a practice is only possible because language-users can take each other to be disposed to use and respond to signs in similar and predictable ways.

It is worth pulling apart two aspects of this. Signs are both effects and causes, *triggered by* one set of dispositions, or habits, and *triggering* another. We take each other, and indeed ourselves, to *apply* the term in the same way on different occasions, and to *respond* to the term over time with the same consistency. There would be no point in writing 'Don't forget to buy milk' on the palm of one's hand, unless one could rely on one's own habit of interpreting those marks in a certain way, when one gets to the supermarket. Most of the time, we can rely on the constancy of the relation between us and the signs, at both ends of the transaction.

For present purposes, we can again skate over very large issues about the nature of such habits. One important divide, like the one we encountered above, will be between Kantian and Humean conceptions, normative and non-normative, respectively. For present, what matters is simply that this is another place at which our own temporality is immediately important to understanding what we do.

In this case, our own contingency can easily be made salient, and doing so is at the heart of some well-known philosophical points. The so-called rule-following considerations turn on the observation that no finite set of shared experiences can guarantee that different language users will form the *same* expectations for what counts as 'going on in the same way', in new applications. (This point is usually made in terms of classification of a new instance, but it applies equally to the interpretation of yesterday's sign – it is the same issue.) So here is a particular place at which, thanks to the temporal, open ended, nature of language – the way it 'points to the future' – the contingencies of our own dispositions to recognise patterns provide a universal source of the trail of the human serpent. (We can't imagine non-temporal language users, but we can imagine users who, though mostly like us, project into the future in different ways.)

Elsewhere I have argued that the rule-following considerations provide a direct path to global neo-pragmatism. In the forthcoming second edition of *Facts and the Function of Truth* (Price 2023) I put the point in terms of the recipe for neo-pragmatism summarized above.

Two of the ingredients in the recipe are a use-first approach to meaning, and the identification of pragmatic grounds. Once we have these ingredients in view, there's an obvious path to globalisation. We simply need to argue that any kind of declarative cake needs a handful of pragmatic grounds, blended into a use-first account of some aspect of its meaning.

Where to find such an argument? In effect, [the first edition of *Facts and the Function of Truth*] claimed to do so in the rule-following considerations, and what they reveal about the way in which meaning depends on what are at base simply contingent dispositions to treat one thing as like another. Communication is possible because, most of the time, we are disposed to 'go on in the same way' *in the same way* – but divergence is always possible, leading, in principle, to [No Fault Disagreements]. These dispositions are themselves pragmatic grounds, in the terminology we have been using, and they are absolutely global. Anything that counts as language depends on them.

These dispositions are thus an essential ingredient, without which no linguistic cake can possibly stand up. In fact, we have more than we need. It would have been enough to show that any assertoric language game needs some sort of use-first component – perhaps a different one in different games. We have shown that there is *a particular kind of use-first component* that is needed in all such games. (Price 2023, ch. 12)

Again, the message I want to emphasize here is that these are lessons that depend on the dynamic, serial, temporal character of language and thought.

8. Great expectations: thought as a predictive engine

We might summarize the previous two sections by saying that at all three corners of the Mind–Language–Manifest World triangle – in *concepts*, *terms*, and *properties*, respectively – we have found the marks of the kind of temporal creatures that we are. I have argued that these are deeply neo-pragmatist conclusions. As the sixth and final step on our stairway, I want to describe some recent developments in the science of the mind that seem to push this viewpoint even further, with further implications for pragmatism.

By way of introduction, let's revisit a prominent theme in twentieth century pragmatism, one that has already played a role in our story. We touched in §6 on Ramsey's conception of the hypothetical, *future-facing* character of human thought. As Ramsey puts it, '[v]ariable hypotheticals or causal laws form the system with which the speaker meets the future' (GPC, 137). Elsewhere in GPC, as Misak (2016, §6.6) notes, Ramsey characterizes beliefs in general as future-facing habits: 'all belief involves habit' (GPC, 138), and 'it belongs to the essence of any belief that we deduce from it, and act on it in a certain way' (GPC, 147) Ramsey makes similar remarks about concepts, definitions of which 'show how we intend to use them in the future', as he puts it (Ramsey 1929b, 1, quoted by Misak, forthcoming, 2).

As I noted, Misak (2016) shows us how Ramsey got these ideas from Peirce, and bestowed them in turn on Wittgenstein. The remarks we quoted from Wittgenstein in 1930 – ‘Every sentence we utter in everyday life appears to have the character of a hypothesis’, and ‘the representation loses all its value if the hypothetical element is dropped, because then the proposition does not point to the future any more’ – may thus be regarded the intellectual grandchildren, via Ramsey, of remarks like this from Peirce: ‘The rational meaning of every proposition lies in the future’ (Peirce 1905, 174). As Misak glosses Peirce’s view, ‘[p]art of a proposition’s meaning is how action and experience will play out.’ (Misak, forthcoming, 4)

I have emphasized this future-facing theme in early pragmatism in order to make the point that in our own time, the so-called *Predictive Processing Framework* (PPF) puts a stance recognisably related to it at the core of the study of the brain itself. ‘Brains, it has recently been argued, are essentially prediction machines.’ (Clark 2013) Jakob Hohwy introduces PPF like this:

A new theory is taking hold in neuroscience. The theory is increasingly being used to interpret and drive experimental and theoretical studies, and it is finding its way into many other domains of research on the mind. It is the theory that the brain is a sophisticated hypothesis-testing mechanism, which is constantly involved in minimizing the error of its predictions of the sensory input it receives from the world. This mechanism is meant to explain perception and action and everything mental in between. It is an attractive theory because powerful theoretical arguments support it. It is also attractive because more and more empirical evidence is beginning to point in its favour. It has enormous unifying power and yet it can explain in detail too. (Hohwy, 2013, 1)

Similarly from Andy Clark:

The key idea, one that seems to be turning up in very many guises in contemporary cognitive science, is that we also learn about the world by attempting to generate the incoming sensory data for ourselves, from the top-down, using the massed recurrent connectivity distinctive of advanced biological brains. This works because good models make better predictions, and we can improve our models by slowly amending them (using well-understood learning routines) so as to incrementally improve their predictive grip upon the sensory stream.

The core idea, as it emerges for the simple ... case of passive perception, can now be summarized. To perceive the world is to meet the sensory signal with an apt stream of multilevel predictions. Those predictions aim to construct the incoming sensory signal ‘from the top down’ using stored knowledge about interacting distal causes. To accommodate the incoming sensory signal in this way is already to understand quite a lot about the world. Creatures deploying this kind of strategy learn to become knowledgeable consumers of their own sensory stimulations. They come to know about their world, and about the kinds of entity and event that populate it. Creatures deploying this strategy, when they see the grass twitch in just that certain way, are *already expecting* to see the tasty prey emerge, and *already expecting* to feel the sensations of their

own muscles tensing to pounce. An animal, or machine, that has that kind of grip on its world is already deep into the business of understanding that world. (Clark 2016, 6)

I hope that these introductory remarks, by two of the leading philosophers writing about PPF, are enough to convey a sense of alignment between the dynamic view achieved by the route described in the previous sections – pragmatists ascending a stairway without venturing very far from their armchairs – and PPF. I hope that they provide grounds for confidence that the ascent was worth it, and that the viewpoint achieved will turn out to have respectable empirical foundations. The main message, once again, is that the temporality of our own natural condition – in many ways, like that of all our animal ancestors and cousins – is central to an understanding of who and what we are.

But is this really a pragmatist lesson? As Daniel Williams (2018) has pointed out, this is controversial. Some writers, including Hohwy, draw lessons from PPF that seem deeply in tension with core tenets of pragmatism. For example, they take it to support a Cartesian, representational conception of the brain:

The prediction of the generative model of the world maintained in the brain is an internal *mirror of nature*, it recapitulates the causal structure of the world and prediction error is minimized relative to the model's expected states. (Hohwy 2013, 220, emphasis added)

Having approached this shared predictive ground by our own route, it is immediately clear how we might resist this conclusion. By neo-pragmatist lights, the 'causal structure of the world' is not brutally *there*, waiting to be recapitulated by passing brains. On the contrary, a causal model is in an essential respect a tool for a brain of a certain sort (one with the capacity to intervene in its environment). This is not to deny that there are better and worse such models, and hence room for improvement by the error-correcting techniques at the core of PPF.²³ But it is to deny that the upshot of such techniques is usefully compared simply to a more accurate mirror.

Williams describes several apparent tensions between pragmatism and PPF, but concludes that they are superficial:

These considerations, then, suggest that the initial appearance of a deep conflict between pragmatism and predictive processing is illusory. Far from an image of minds as passive spectators on the world, recovering the objective structure of the environment like an idealised scientist, predictive processing advances a fundamentally pragmatic brain, striving to maintain the viability of the organism under hostile conditions and in so doing actively *generating* an affective niche—an experienced world structured by the idiosyncratic practical interests of the organism. What emerges is something much closer to Price's (2011a) metaphor of a "holographic data projector"

²³ Throughout GPC Ramsey is sensitive to the question of what improvement looks like, for mental states that have this habitual, expectational character.

... than a passive reflection of an independently identifiable world.²⁴ As Clark (2015, 4) puts it, it is a vision of experience that is “maximally distant from a passive (“mirrors of nature”) story.”

Whilst less central to Peirce’s work, this commitment to the constructive nature of experience lay at the core of James’s pragmatist vision, underlying his famous remark that “the trail of the human serpent is... over everything” [James 1907, 64]. For James, our status as a certain kind of *creature* inextricably colours our commerce with the world. Likewise, Dewey’s famous interactive conception of knowledge holds that knowledge of the world is formed as an adaptive *response* to environmental circumstances given the agent’s needs and purposes, an ongoing process in which the subject moulds and constructs the very environments it inhabits (Dewey 1925; Godfrey-Smith 2013). For this reason, Dewey was a central influence on Gibson and the tradition of ecological psychology, where the idea that an organism’s perceived environment is fundamentally a world of “affordances”—roughly, opportunities for environmental intervention (Chemero 2009)—highlights the functional importance of its practical interests, abilities and morphology in bringing forth its experienced world (Gibson 1979). (Williams 2018, 848)

This passage gives some sense of the richness of the question of the relation of PPF to pragmatism, or traditions on which pragmatism builds. Hohwy (2013) also gives a brief account of its origins in Helholz’s response to Kant. If PPF fulfills its present promise this history will become well known. But to wrap up here, I want to close with a different kind of historical connection. Here is Dennett, proposing that PPF offers an insight into the metaphor at the heart of Hume’s neo-pragmatism:

It is everybody’s job – but particularly the philosophers’ job – to negotiate the chasm between what Wilfrid Sellars (1962) called the *manifest image* and the *scientific image*. The manifest image is the everyday world of folk psychology, furnished with people and their experiences of all the middle-sized things that matter. The scientific image is the world of quarks, atoms, and molecules, but also (in this context particularly) sub-personal neural structures with particular roles to play in guiding a living body safely through life. The two images do not readily fall into registration

Consider what I will call Hume’s Strange Inversion (cf. Dennett 2009). One of the things in our world is causation, and we think we see causation because the causation in the world directly causes us to see it – the same way round things in daylight cause us to see round things, and tigers in moonlight cause us to see tigers. When we *see* the thrown ball causing the

²⁴ This is the passage from (Price 2011a) that Williams has in mind:

[I]f language is not a [representational] telescope, then what is it? As Brandom points out, a traditional expressivist option is the lamp. I think that modern technology allows us to make this a little more precise. Think of a data projector, projecting internal images onto an external screen. Even better, helping ourselves to one of tomorrow’s metaphors, think of a holographic data projector, projecting three-dimensional images in thin air. This isn’t projection *onto* an external, unembellished world. On the contrary, the entire image is free-standing, being simply the sum of all we take to be the case: a world of states of affairs, in all the ways that we take states of affairs to be. (2011a, 28)

window to break, the causation itself is somehow perceptible “out there.” Not so, says Hume. This is a special case of the mind's “great propensity to spread itself on external objects” (*Treatise of Human Nature*, Hume 1739/1888/1964, I, p. xiv). In fact, he insisted, what we do is misinterpret an inner “*feeling*,” an anticipation, as an external property. The “customary transition” in our minds is the *source* of our sense of causation, a quality of “perceptions, not of objects,” but we mis-attribute it to the objects, a sort of benign user-illusion, to speak anachronistically. As Hume notes, “the contrary notion is so riveted in the mind” (p. 167) that it is hard to dislodge. It survives to this day in the typically unexamined assumption that all perceptual representations must be flowing inbound from outside.

... If we use the shorthand term “projection” to try to talk, metaphorically, about the mismatch between manifest and scientific image here, what is the true long story? What is literally going on in the scientific image? A large part of the answer emerges, I propose, from the predictive coding perspective.

Every organism, whether a bacterium or a member of *Homo sapiens*, has a set of things in the world that matter to it and which it (therefore) needs to discriminate and anticipate as best it can. Call this the ontology of the organism, or the organism's *Umwelt* ... An animal's *Umwelt* consists in the first place of *affordances* (Gibson 1979), things to eat or mate with, openings to walk through or look out of, holes to hide in, things to stand on, and so forth.

... But among the things in our *Umwelt* that matter to our well-being are *ourselves*! We ought to have good Bayesian expectations about what we will do next, what we will think next, and what we will *expect* next! And we do. Here's an example:

Think of the cuteness of babies. It is not, of course, an “intrinsic” property of babies, though it seems to be. What you “project” out onto the baby is in fact your manifold of “felt” dispositions to cuddle, protect, nurture, kiss, coo over, . . . that little cutie-pie. It's not just that when your cuteness detector (based on facial proportions, etc.) fires, you have urges to nurture and protect; you *expect* to have those very urges, and that manifold of expectations just *is* the “projection” onto the baby of the property of cuteness. When we expect to see a baby in the crib, we also expect to “find it cute” – that is, we *expect to expect* to feel the urge to cuddle it and so forth. When our expectations are fulfilled, the absence of prediction error signals is interpreted as confirmation that, indeed, the thing in the world we are interacting with has the properties we expected it to have. Cuteness as a property passes the Bayesian test for being an objective structural part of the world we live in, and that is all that needs to happen. Any further “projection” process would be redundant. What is special about properties like sweetness and cuteness is that their perception depends on particularities of the nervous systems that have evolved to make much of them. The same is of course also true of colors. This is what is left of Locke's (and Boyle's) distinction between primary and secondary qualities. (Dennett 2013, 209–210)

9. Neo-pragmatism, natural science, and the physics of time

Those remarks from Dennett began with Sellars' distinction between the scientific and manifest images, and closed with the distinction between primary and secondary qualities. This is thus an apt point to return to a question I raised but postponed in §1. In what sense can a *global* neo-pragmatist really allow either distinction? Doesn't a global version of the view necessarily put science itself on the manifest or secondary side? This is one of two issues I want briefly to discuss in this closing section. The other is in a sense a more specific form of the same question. What is the relation between temporal neo-pragmatism of the kind advocated above and the science, or more specifically the physics, of time itself?

9.1 Making science manifest?

Hilary Putnam once proposed that Kant is someone who thinks that everything is a secondary quality (Putnam 1981, 60–61). Putnam interprets this as a kind of global pragmatism. This is a convenient taster for global neo-pragmatism in my sense, though as I have noted elsewhere (Price 2023a, ch. 11), we need to understand the proposal in the right way. Putnam himself describes the view like this: 'If *all properties are secondary*, what follows? It follows that everything we say about an object is of the form: it is such as to affect us in such-and-such a way.' (1981, 61) My kind of neo-pragmatism will not put things this way, because it wants to put the human element in the background, in *use conditions*, rather than in the foreground, in the content or truth conditions of *what is said*. Neo-pragmatism does not tell us *what our words say*, but *how our words are used*.²⁵

With that important qualification, I think that a global neo-pragmatist should endorse the view that Putnam attributes to Kant, and see it as on all fours (so to speak) with James' remark about the human serpent. And as for the secondary/primary distinction, so for the manifest/scientific distinction: there is a sense in which global neo-pragmatism (rightly) implies that the manifest image goes all the way down. Science doesn't take us anywhere else.

But how then to square this with my neo-pragmatist endorsement of subject naturalism, naturalism in the sense of Hume? Doesn't that require that we see the scientific standpoint as privileged, in some sense? My answer is yes – but not in a sense that conflicts with the point just made.

To make this work, we need to distinguish two senses in which science might be held to be privileged. The first sense relies on the observation that the neo-pragmatists' investigations are conducted *within* natural science. First and foremost, neo-pragmatists are interested in first-order scientific questions about natural creatures such as ourselves: why do these creatures think and talk in these terms? Call this the *home-turf* sense of privilege. In the neo-pragmatist's inquiry, science is indeed privileged in this home-turf sense – the inquiry is taking place on science's own territory. But it is not privileged in the sense that its own activities and practices are somehow excluded from the domain of investigation. There is no *ring-fence*, preventing the same scientific gaze being turned on the language and conceptual categories of

²⁵ Compare my remarks about the notion of response-dependent properties in §2.3. This distinction is central to my early piece 'Two paths to pragmatism' (Price 1993).

science itself. So home-turf privilege for natural science, yes, ring-fence privilege, no. That's the combination that global neo-pragmatism recommends and requires.²⁶

Two notes about how this relates to our discussion above. First, home-turf privilege is quite sufficient for the work of §4, where we were distinguishing the human view of time – what Callender (2017) calls manifest time – from the view of time that emerges from physics. Second, a neo-pragmatist will already take the work of §5 and §6, let alone §7 and §8, to count against ring-fence privilege. The temporal modalities (§5) and dispositions (§6) are likely to prove essential to natural science, so neo-pragmatism there is already neo-pragmatism that breaches any plausible fence that might be erected around scientific practice.

9.2 Neo-pragmatism and the physics of time

Neo-pragmatism is an inquiry within natural science, although not primarily within physics. On the contrary, its main focus is on aspects of the behavior and psychology of creatures such as ourselves (mainly, our use of various words and concepts). However, it is certainly interested in explaining these aspects of behavior in terms of the natural character and situation of these creatures, and here physics soon becomes relevant. Whatever else these creatures are, they are creatures of physical form, within a physical environment. More specifically, the kind of neo-pragmatism described at each of our steps above has tried to tie aspects of what these creatures say and think to *temporal* features of their natural condition. Describing and explaining these temporal features seems likely to lead us quickly to the physics of time, although perhaps not necessarily at its most fundamental level.²⁷

In practice, some of the required connections seem to be quite direct. We already have a hint of this in the Boltzmann-Schuetz hypothesis (§4), which postulates that the kind of entropy gradient we observe in our region of the universe is responsible for our perception of the difference between past and future. Boltzmann proposes that this perception would reverse in regions in which the gradient sloped in the other direction, and would be wholly absent in regions without such a gradient at all (because creatures like us could not exist there). As he puts the former point, 'a living being in a particular time interval of such a single world' – in other words, a single region in which entropy is, by chance, very low – will 'distinguish the direction of time toward the less probable state from the opposite direction (the former toward the past, the latter toward the future).'²⁸ (Boltzmann 1964, 447)

It has been a century and a quarter since Boltzmann and Schuetz discussed these issues, and there has been considerable progress in filling some of the details.²⁹ Beginning with the physics that makes the

²⁶ This combination is familiar in other contexts, of course. Theoretical linguists do not exempt their own language from their subject's domain of inquiry. A well-constituted law enforcement agency has a duty and the means to enforce the law within its own ranks.

²⁷ In principle, really fundamental issues in the physics of time might turn out to have little to do with biology and psychology. In principle, indeed, time itself might not be fundamental; see Barbour (1999) for a view of this kind.

²⁸ For an excellent recent discussion of the Boltzmann-Schuetz proposal, including the question how much belongs to Schuetz and how much is added by Boltzmann, see Barbour (2020b).

²⁹ To be clear, later scientists have not endorsed the Boltzmann-Schuetz hypothesis about the origin of low entropy in our region; see Penrose (1989), Price (1996, 2010), Carroll (2010), Barbour (2020a), Rovelli (2022a) for discussion. What has proved more durable is the associated postulate about the relation between the entropy gradient and other matters, such as the human perception of time.

emergence of life possible, two things seem especially crucial. The first is the fact that entropy is very low at some point in (what we evolved intelligences think of as) our distant past. Now often known as the Past Hypothesis, this is widely assumed to be some sort of characteristic of the very early universe, and hence a matter for cosmology.³⁰ Its precise explanation, and indeed the question whether it calls for explanation at all, are still matters for debate.³¹

The second crucial requirement is that some of the processes that take the universe from this low entropy starting point towards thermodynamic equilibrium are extremely slow. It is a familiar feature of many everyday cases that equilibration takes different amounts of time in different physical systems. Milk mixes into coffee very quickly, but the coffee cools to room temperature much more slowly, especially in an insulated container. In the cosmological case the relevant processes take billions of years, in some cases. Luckily for us, these processes create two things: vast metastable reservoirs of low entropy, in the form of diffuse clouds of hydrogen; and many local ‘furnaces’ – what we know as stars – that tap into those reservoirs, allowing some of the energy trapped within them to escape. Both the reservoirs and the furnaces are comparatively stable, in many cases, over these cosmological time scales. In the regions surrounding the furnaces, if other conditions are suitable, life may arise and evolve, feeding on the hot photons provided by the nearby star.

From a very early stage, apparently, such life forms will find it useful to monitor their environments, and to modify their behavior accordingly. This is likely to be advantageous as soon as they become capable of doing more than one thing, say by becoming capable of influencing their own motion. Once one can do that, it is useful to be able to detect a nutrient gradient, and to proceed to climb it. Notice that these are already time-asymmetric processes. We are imagining such creatures acquiring information from one temporal direction (the one their intelligent descendants think of as the past), and then modifying their behavior in the other direction.

Is this essential, or are we anthropomorphizing these simple creatures, in imagining them restricted in this way? It would be even more advantageous, presumably, if they could also obtain information directly from the other direction – i.e., about the *future* locations of nutrients, predators, and potential mates. But that’s a much harder trick. In a universe (or a region of a universe, in the Boltzmann-Schuetz sense) such as ours, physics seems to permit the acquisition and storage of information from one temporal direction but not from the other – from the past but not the future, in ordinary parlance. This is known as the temporal asymmetry of *records*, or *traces*. Its precise explanation is not yet agreed,³² but it seems clear that it is another point at which physics of time, especially thermodynamics, connects very directly to factors of relevance to the neo-pragmatist project.

³⁰ So far as I know, the first writer to suggest this link is Eddington, who says: ‘We are thus driven to admit anti-chance; and apparently the best thing we can do with it is to sweep it up into a heap at the beginning of time’ (1931, 452). One of the notable things about this suggestion is that Eddington was writing only a few years after Hubble’s discovery of the expansion of the universe, which gave new reason to suspect that it might have a beginning. See Price (2010) for further discussion. The terminology ‘Past Hypothesis’ is due to Albert (2000), who credits the idea to Feynman.

³¹ See Penrose (1989), Price (1996, 2010), Carroll (2010), Barbour (2020a), and Rovelli (2022a) for discussions of various explanations; and Callender (2004) and Price (2004) for discussion about whether such an explanation is needed.

³² See Reichenbach (1956), Albert (2000), Fernandes (2022), and Rovelli (2022a, 2022b), for discussion.

Some recent writers have investigated the temporal characteristics of information-exploiting creatures in terms of simple formal models. In particular, the physicist James Hartle (2005) proposed to do so in terms of what he calls an *IGUS* – an *information gathering and utilizing system*. Philosophers such as Ismael (2016) and Callender (2017) have extended this idea, aiming to throw light on various features of the human psychology of time.

9.3 *Boundary disputes*

Clearly, this kind of project calls for sharp attention to the questions of what goes into the manifest image, as something to be explained; and what is retained in the underlying science, whether in the physics of time or temporal aspects of biology. Not all of these demarcation lines are presently clear, in my view, and this remains true even if we set aside attempts by authors such as Maudlin (2007), Smolin (2013), and Dowker (2022) to resurrect a richer physics of time – a physics that finds a place for a distinguished present moment, or for temporal passage, for example.

One particularly interesting case is that of causation. In §5 I recommended a neo-pragmatist account of causation, including a neo-pragmatist explanation of the time-asymmetry of causation. But this is a strikingly less popular view than neo-pragmatism about some or all of the features of manifest time. Many writers are very happy to venture as far as the second step on our neo-pragmatist stairway, in other words, but balk at – or simply miss – the possibility of going further. Callender (2017) is an interesting case in point. While he doesn't take an explicit stand on the status of causation, he feels comfortable in appealing to the asymmetry of counterfactual dependence – itself closely related to the causal asymmetry, apparently – in explaining why we care more about the future than the past (Callender 2017, ch. 12). My kind of neo-pragmatist thinks that we need to dig a bit deeper, and to look for a package that *explains* our practice of counterfactual reasoning, including its temporal aspects.³³

What is the alternative to a neo-pragmatist approach to the time-asymmetry of causation and counterfactuals? Its main rivals attempt to account for these asymmetries directly in terms of the thermodynamic asymmetry (rather than indirectly, as the neo-pragmatist prefers, by appealing to the perspective of creatures whose own existence relies on the thermodynamic asymmetry).³⁴ The issues at stake here are subtle, and the main lesson I want to stress here is that we need to pay very close attention to what we take the question to be. Are we interested in saying what causation *is*, or in *explaining causal thinking*? These are very different projects, and unless all sides appreciate the difference, they are liable to find themselves arguing with imaginary opponents.

³³ I recommend such an extension of Callender's project (Price 2019).

³⁴ See Albert (2000, 2015), Loewer (2007, 2012), and Rovelli (2022a), for versions of this proposal; and Frisch (2007, 2012, 2014) and Price and Weslake (2010), for criticism of it from various perspectives. Beebe (2015) makes the point that in least in the case of the Loewer-Albert version of the proposal, there is considerable convergence in the direction of the neo-pragmatist view, in the sense that counterfactuals involving (the supposed neural correlates of) human decisions play a crucial role.

9.4 Memory versus agency

Among the various aspects of manifest time, the apparent distinction between fixed past and open future seems particularly closely linked to the causal asymmetry. In my transition from §4 to §5 above, I took advantage of the fact that Ramsey treats them as one package, both to be explained in terms of the epistemic standpoint of a deliberating agent. It is worth stressing the difference between this approach and another common strategy for putting the former distinction on the manifest side, a strategy that appeals not to agency but to *memory*.

Here Russell provides an example. In the famous 1912 lecture in which he dismisses causation altogether – arguing that modern time-symmetric physics leaves no place for it – Russell says the following about the apparent difference between past and future.

We all regard the past as determined simply by the fact that it has happened; but for the accident that memory works backward and not forward, we should regard the future as equally determined by the fact that it will happen.³⁵ (Russell 1913, 20–21)

Contra Russell, it now seems plausible that this fact about memory is no mere accident, but is a reflection – a special case, evolved in the biological realm – of the asymmetry of records and traces, and hence of the entropy gradient. Intelligent creatures will always find that ‘memory works backward and not forward’, from their own points of view – even though *which direction that is*, from the universe’s point of view, will depend on the orientation of the particular entropy gradient on which they find themselves.³⁶

This point about ‘mere accidents’ aside, is Russell right that the apparent difference between fixed past and open future stems from a feature of our own memories? If so, we would have a pleasingly direct connection between temporal physics and this aspect of manifest time. But in §4 we encountered Ramsey’s alternative proposal. For Ramsey, the apparent openness of the future is associated with our perspective as *agents*, not as mere *observers* and *memorisers*. This is also a neo-pragmatist proposal, but a different one, for it ties the feature to be explained to a different aspect of the kind of creatures that we are. (For Ramsey, as we saw, it is a package deal with his agent-based neo-pragmatist account of causation.)

If we invoke agency in one or both of these ways, then again we should ask the scientific questions about the notions on which the account relies. What is it, in general terms, to be an agent? And how does the existence of agents relate to the physics of time? These questions, too, have been the focus of much recent work, from various perspectives.³⁷ Once again, it is common ground that the entropic

³⁵ Presumably Russell knew of Lewis Carroll’s White Queen, whose memory worked in both directions: ‘It’s a poor sort of memory that only works backwards’, as the Queen says to Alice. So it is notable that this is the same lecture in which Russell famously dismisses the monarchy, along with causation, as ‘a relic of a bygone age’. Moreover, the lecture was written at the period in which, as Norbert Wiener would later write of Russell, it was ‘impossible to describe [him] except by saying that he looks like the Mad Hatter.’ (Wiener 1964, 194) So it would be a missed opportunity, to say the least, if Russell did not have the White Queen in mind!

³⁶ The White Queen is thermodynamically impossible, in other words.

³⁷ See, for example, Evans, Milburn and Shrapnel (2021), Ismael (2011, 2016), and Rovelli (2022a, 2022b).

environment is crucial for the physical existence of agents. As in the case of memory, it is no accident that we act for goals in one temporal direction only, in this case the direction in which entropy is increasing.

10. Demarcation issues

In closing, let me list again the three demarcation issues touched on above. I do so because I take all of them to offer interesting live issues for further discussion, and because I want to emphasize again an important general lesson: in discussing neo-pragmatism and its rivals, it is crucial to keep in mind what questions we take ourselves to be addressing.

Two of these demarcation issues concern boundaries between neo-pragmatism and rival approaches, and involve questions that even an enthusiastic neo-pragmatist might fairly regard as still up for debate. The first concerns the split between manifest time and time as properly studied by physics,³⁸ the second the split between neo-pragmatist and rival approaches to probability and causation. If we think of these two issues as active fault-lines, the key point I want to stress is that in each case, the materials on either side of the fault have very different compositions: on one side, the igneous bedrock of physics or metaphysics; on the other, the sedimentary strata of pragmatism, built like corals reefs from the activity of diverse creatures, human and otherwise.³⁹ These fault-lines are discontinuities, in the geological sense. They involve physics or metaphysics on one side, but psychology, broadly construed, on the other. To fail to notice that difference is a recipe for continued confusion.

The third demarcation issue is different. As I put it above, it is the question whether we appeal to memory or to agency, in accounting for the difference between fixed past and open future, or for the causal asymmetry. In this case we have a disagreement *within* the neo-pragmatist camp, between two rival explanations of the observed geological data. Both sides agree that the geology displays the trail of the human serpent, and no doubt of many pre-human ancestor serpents, in a way that igneous bedrock would not. They disagree about which characteristic of the serpent has left its mark.⁴⁰

References

- Albert, D., 2000, *Time and Chance*, Cambridge, MA: Harvard University Press.
- Albert, D., 2015, *After Physics*, Cambridge, MA: Harvard University Press.
- Anscombe, G. E. M., 1975. The First Person. In S. Guttenplan (ed.), *Mind and Language: Wolfson College Lectures 1974*, Oxford: Clarendon Press, 45–64.
- Barbour, J., 1999. *The End of Time*. London: Weidenfeld and Nicholson.
- Barbour, J., 2020a. *Janus Point: A New Theory of Time*. Basic Books.

³⁸ As I noted above, recent advocates of a richer physics of time – a physics including ‘passage’, for example – include Maudlin (2007), Smolin (2013), and Dowker (2022).

³⁹ Pragmatists will recognize ‘coral reefs’ as a hat-tip to Rorty. ‘Davidson lets us think of the history of language, and thus of culture, as Darwin taught us to think of the history of a coral reef’, as Rorty puts it (1989, 16).

⁴⁰ I am very grateful to Helen Beebe, Josh Gert, Cheryl Misak, Carlo Rovelli and Dan Williams for comments on earlier versions, and also to audiences at Cambridge, Berkeley, Munich, Helsinki, Dublin and the Dewey Center, Fudan University, for much discussion at talks based on this material.

- Barbour, J., 2020b. *A History of Thermodynamics*. Typescript, accessed 14 September 2022 at http://www.platonica.com/A_History_of_Thermodynamics.pdf
- Beebe, H., 2015. Causation, Projection, Inference, and Agency. In Robert N. Johnson, and Michael Smith (eds), *Passions and Projections: Themes from the Philosophy of Simon Blackburn*, Oxford University Press, 25–48.
- Bird, A., 2012. Dispositional Expressions. In G. Russell, & D. G. Fara (Eds.), *Routledge Companion to the Philosophy of Language*, 729–740. Routledge.
- Boltzmann, L., 1964. *Lectures on Gas Theory, 1896–1898*, S. Brush (Trans.), Berkeley: University of California Press.
- Boncompagni, A., 2017. The ‘Middle’ Wittgenstein (and the ‘Later’ Ramsey) on the Pragmatist Conception of Truth. In Misak and Price (2017), 29–44.
- Braddon-Mitchell, D., 2004. How do we know it is now now?. *Analysis*, 64,199–203.
- Brandom, R., 2008. *Between Saying and Doing: Towards an Analytic Pragmatism*, Oxford University Press.
- Brandom, R., 2013. Global Anti-Representationalism?. In Price et al (2013), 85–111.
- Braun, David, 2017. Indexicals. *The Stanford Encyclopedia of Philosophy* (Summer 2017 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/sum2017/entries/indexicals/>.
- Callender, C., 2004. There Is No Puzzle about the Low Entropy Past. In Christopher Hitchcock (ed.), *Contemporary Debates in Philosophy of Science*. Blackwell. pp. 240–255.
- Callender, C., 2017. *What Makes Time Special?* (NY, OUP 2017)
- Carnap, R., 1936 & 1937. Testability and Meaning. *Philosophy of Science*, 3, 419–471, 4,1–40.
- Carroll, S., 2010. *From Eternity to Here: The Quest for the Ultimate Theory of Time*. Dutton.
- Cartwright, N., 1979. Causal laws and effective strategies. *Noûs*, 13(4):419–437.
- Chemero, A., 2009. *Radical embodied cognitive science* (1st ed.). Cambridge: MIT Press.
- Choi, S. and Fara, M., 2021. Dispositions. *The Stanford Encyclopedia of Philosophy* (Spring 2021 Edition), Edward N. Zalta (ed.), forthcoming URL = <https://plato.stanford.edu/archives/spr2021/entries/dispositions/>.
- Clark, A., 2013. Whatever next? Predictive brains, situated agents, and the future of cognitive science. *Behavioral and Brain Sciences*, 36(3), 181–204. doi:10.1017/S0140525X12000477
- Clark, A., 2015. Predicting peace: The end of the representation wars—A reply to Michael Madary. In T. Metzinger & J. M. Windt (Eds.), *Open MIND*: 7(R). Frankfurt am Main: MIND Group. <https://doi.org/10.15502/9783958570979>.
- Clark, A., 2016. *Surfing uncertainty*. Oxford University Press.
- Dennett, D., 2009. Darwin's “Strange Inversion of Reasoning”. *Proceedings of the National Academy of Sciences USA* 106 (Suppl. 1):10061–65.
- Dennett, D., 2013. Expecting ourselves to expect: The Bayesian brain as a projector. *Behavioral and Brain Sciences*, 36(3), 209–210. doi:10.1017/S0140525X12002208
- Dewey, J., 1925. *Experience and Nature*. La Salle: Open Court.
- Dowker, F., 2022. Causal Set Quantum Gravity and the Hard Problem of Consciousness, preprint, <https://doi.org/10.48550/arXiv.2209.07653>
- Earman, J., 1974. An Attempt to Add a Little Direction to “The Problem of the Direction of Time”. *Philosophy of Science*, 41, 15–47.
- Eddington, A., 1928. *The Nature of the Physical World*, Cambridge University Press.
- Eddington, A., 1931. The End of the World: from the Standpoint of Mathematical Physics. *Nature*, 127, 447–453.

- Evans, P., Milburn, G. & Shrapnel, S., 2021. Causal asymmetry from the perspective of a causal agent. Preprint, accessed 25 August 2022 at <http://philsci-archive.pitt.edu/18844/>
- Fernandes, A., 2022. How to explain the direction of time. *Synthese* 200, 389. <https://doi.org/10.1007/s11229-022-03818-4>
- Frisch, M., 2007, Causation, Counterfactuals and Entropy. In Price and Corry 2007: 351–395.
- Frisch, M., 2010, Does a Low-Entropy Constraint Prevent Us from Influencing the Past?. In *Time, Chance and Reduction: Philosophical Aspects of Statistical Mechanics*, Gerhard Ernst and Andreas Huttemann (eds.), Cambridge: Cambridge University Press, 13–33. doi:10.1017/CBO9780511770777.002
- Frisch, M., 2014, *Causal Reasoning in Physics*, Cambridge: Cambridge University Press. doi:10.1017/CBO9781139381772
- Gibson, J., 1977). *The ecological approach to visual perception* (1st ed.). Boston: Houghton-Mifflin.
- Godfrey-Smith, P., 2013. John Dewey's experience and nature. *Topoi*, 33(1), 285–291. <https://doi.org/10.1007/s11245-013-9214-7>.
- Goodman, N., 1954. *Fact, Fiction, and Forecast*. London: Athlone Press.
- Haldane, J. and Wright, C., eds., 1993. *Reality, Representation, and Projection* (New York and Oxford: Oxford University Press).
- Hartle, J., 2005. The physics of now. *American Journal of Physics* 73, 101–109. <https://doi.org/10.1119/1.1783900>
- Healey R., 2017. *The Quantum Revolution in Philosophy*, Oxford University Press.
- Hohwy, J., 2013. *The Predictive Mind*, OUP.
- Ismael, J., 2007. *The Situated Self* (NY, OUP).
- Ismael, J., 2011. Decision and the open future. In Bardon, A. (Ed.), *The Future of the Philosophy of Time*. Routledge, 149–168. <https://doi.org/10.4324/9780203338315>
- Ismael, J. 2016. *How Physics Makes Us Free*, New York: Oxford University Press.
- James, W., 1907. *Pragmatism: A New Name for Some Old Ways of Thinking*. Longmans, Green, and Company.
- Kneale, W., 1949. *Probability and Induction*. Clarendon Press.
- Kripke, S., 1972. Naming and necessity. In D. Davidson, & G. Harman (Eds.), *Semantics of natural language* (pp. 253–355, 763–769). Dordrecht: Reidel.
- Johnston, M., 1993. Objectivity Refigured: Pragmatism Without Verificationism. In Haldane and Wright (1993), 85–130.
- Levi, I., 2000. The foundations of causal decision theory. *Journal of Philosophy*, 97, 387–402.
- Lewis, D., 1973. *Counterfactuals*. Oxford: Blackwell.
- Lewis, D., 1979. Attitudes De Dicto and De Se. *The Philosophical Review*, 88, 513–543. Reprinted in his *Philosophical Papers I* (New York: Oxford University Press), 133–155. `
- Lewis, D., 1980. A Subjectivist's Guide to Objective Chance. In Harper, W.L., Stalnaker, R., Pearce, G. (eds), *Ifs, The University of Western Ontario Series in Philosophy of Science, vol 15*. Springer, Dordrecht, 267–297. Reprinted in Lewis's *Philosophical Papers*, Vol. II, 83–132. New York: Oxford University Press. Page references are to the latter version.
- Lewis, D., 1994. Humean supervenience debugged. *Mind*, 103(412):473–490.
- Loewer, B., 2007. Counterfactuals and the Second Law. In Price and Corry 2007: 293–326.
- Loewer, B., 2012. Two Accounts of Laws and Time. *Philosophical Studies*, 160(1): 115–137. doi:10.1007/s11098-012-9911-x

- Maier, John, Abilities. *The Stanford Encyclopedia of Philosophy* (Winter 2020 Edition), Edward N. Zalta (ed.), URL = <<https://plato.stanford.edu/archives/win2020/entries/abilities/>>.
- Marion, M., 2012. Wittgenstein, Ramsey and British Pragmatism. *European Journal of Pragmatism and American Philosophy*, 4(2): 54–80. <https://doi.org/10.4000/ejpap.720>
- Maudlin, T., 2007. *The Metaphysics Within Physics*. OUP.
- Mellor, D. H., 1971. *The Matter of Chance*, Cambridge: Cambridge University Press.
- Mellor, D. H., 1982. Chances and degrees of belief. In *What? Why? Where? When?* ed. by R. B. McLaughlin, Reidel, 49–68. Reprinted in Mellor's *Matters of Metaphysics* (CUP, 1991), 235–253. Page references are to the latter version.
- Misak, C., 2016. *Cambridge Pragmatism: From Peirce and James to Ramsey and Wittgenstein* (Oxford: Oxford University Press)
- Misak, C., 2020. *Frank Ramsey: A Sheer Excess of Powers* (Oxford: Oxford University Press)
- Misak, C., forthcoming. Ryle's debt: Ramsey and MacDonald on hypotheses and laws.
- Misak, C. and Price, H., eds, 2017. *The Practical Turn: Pragmatism in the British Long Twentieth Century, Proceedings of the British Academy* 210, Oxford: Oxford University Press.
- Morris, William Edward and Charlotte R. Brown, David Hume. *The Stanford Encyclopedia of Philosophy* (Spring 2021 Edition), Edward N. Zalta (ed.), forthcoming URL = <<https://plato.stanford.edu/archives/spr2021/entries/hume/>>.
- Nozick, R., 1969) Newcomb's problem and two principles of choice. In Rescher, N., editor, *Essays in honor of Carl G. Hempel*, 114–146. Springer.
- Pearl, J., 2000. *Causality: Models, Reasoning and Inference*. Cambridge University Press.
- Peirce, C. S., 1905. What Pragmatism is. *The Monist*, 15, 161–181. <https://doi.org/10.5840/monist190515230>
- Penrose, R., 1989. *The Emperor's New Mind*, Oxford University Press.
- Perry, J. 1979. The Problem of the Essential Indexical. *Noûs* 13, 3–21.
- Price, H., 1981. *The Problem of the Single Case*. PhD thesis, Cambridge University. Retrieved August 13, 2022 from: <https://philarchive.org/rec/PRITPO-47>
- Price, H., 1986. Against causal decision theory. *Synthese* 67, 195–212.
- Price, H., 1988. *Facts and the Function of Truth (1st ed.)*, Basil Blackwell.
- Price, H., 1991. Agency and probabilistic causality. *British Journal for the Philosophy of Science* 42, 157–176.
- Price, H., 1993. Two Paths to Pragmatism. In Peter Menzies (ed.), *Response-Dependent Concepts*, Canberra: Philosophy Program, RSSH, ANU, 46–82. Reprinted in Price (2011a).
- Price, H., 1996. *Time's Arrow and Archimedes' Point: New Directions for the Physics of Time*, Oxford University Press, New York.
- Price, H., 2004a. Naturalism without representationalism. In David Macarthur and Mario de Caro (eds), *Naturalism in Question* (Cambridge, Mass.: Harvard University Press), 71–88. Reprinted in Price (2011a), 184–199. Page references are to the latter version.
- Price, H., 2004b. On the origins of the arrow of time: why there is still a puzzle about the low entropy past. In Christopher Hitchcock, ed., *Contemporary Debates in the Philosophy of Science*, Blackwell, 219–239.
- Price, H., 2007. Causal perspectivalism. In Huw Price and Richard Corry, eds., *Causation, Physics and the Constitution of Reality: Russell's Republic Revisited* (Oxford University Press), 250–292.
- Price, H., 2010. Time's Arrow and Eddington's Challenge. *Séminaire Poincaré XV, Le Temps* (2010), 115–140. Accessible at <http://www.bourbaphy.fr/price.pdf>
- Price, H., 2011a. *Naturalism without Mirrors*, Oxford University Press.

- Price, H., 2011b. The flow of time. In Craig Callender, ed., *The Oxford Handbook of Time* (OUP), 276–311.
- Price, H., 2011c. Expressivism for two voices. In J. Knowles & H. Rydenfelt, eds., *Pragmatism, Science and Naturalism* (Peter Lang, Zürich, Zürich, 2011), 87–113.
- Price, H., 2012. Causation, Chance, and the Rational Significance of Supernatural Evidence. *Philosophical Review* 121, 483–538.
- Price, H., 2017. Causation, intervention and agency—Woodward on Menzies and Price. In Helen Beebe, Chris Hitchcock, and Huw Price (eds), *Making a Difference* (Oxford University Press), 73–98.
- Price, H., 2019a. Global expressivism by the method of differences. *Royal Institute of Philosophy Supplements*, 86, 133–154. <https://doi.org/10.1017/S1358246119000109>
- Price, H., 2019b. What Makes Time Special?. *Philosophical Review*, 128, 250-254.
- Price, H. 2022a. Cheryl Misak, *Frank Ramsey: A Sheer Excess of Powers*. *Society* 59, 52–55. <https://doi.org/10.1007/s12115-022-00675-2>
- Price, H., 2022b. Family feuds? Relativism, expressivism, and disagreements about disagreement. *Philosophical Topics*, Spring 2022.
- Price, H., 2022c. Causation and the open future; Russell, Eddington and Ramsey. Presentation at a Blue Sky Thinking Workshop, University of Surrey, 7 July 2022. Accessed 25 August 2022 at: <https://www.youtube.com/watch?v=eJhvF9MUcis>
- Price, H., 2022d. Global expressivism and alethic pluralism. *Synthese* 200, 386. <https://doi.org/10.1007/s11229-022-03874-w>
- Price, H., 2023. *Facts and the Function of Truth: New Expanded Edition* (Oxford: Oxford University Press).
- Price, H., with S. Blackburn, R. Brandom, P. Horwich and M. Williams, 2013. *Expressivism, Pragmatism and Representationalism*, Cambridge: Cambridge University Press.
- Price, H. and Corry, R. (eds), 2007. *Causation, Physics, and the Constitution of Reality Russell's Republic Revisited*, Oxford: Clarendon Press.
- Price, H. and Liu, Y., 2018. "Click!" Bait for Causalists. In Arif Ahmed (ed), *Newcomb's Problem* (CUP), 160–179.
- Price, H. and Weslake, B., 2010. The time-asymmetry of causation. In Helen Beebe, Christopher Hitchcock and Peter Menzies (eds), *The Oxford Handbook of Causation* (OUP), 414–443.
- Putnam, H., 1981. *Reason, Truth and History*. Cambridge: Cambridge University Press.
- Ramsey, F. P., 1929a. General Propositions and Causality. In D. H. Mellor, ed., *Foundations: Essays in Philosophy, Logic, Mathematics and Economics*. London: Routledge and Kegan Paul, 1978, 133–51.
- Ramsey, F. P., 1929b. Philosophy. In D. H. Mellor, ed., *Philosophical Papers*. Cambridge: Cambridge University Press, 1990, 1–8.
- Reichenbach, H., 1956. *The Direction of Time*, Berkeley, CA: University of California Press.
- Rorty, R., 1989, *Contingency, Irony and Solidarity*, Cambridge University Press.
- Rovelli, C., 2021. Agency in physics. In Claudio Calosi, Pierluigi Graziani, Davide Pietrini, Gino Tarozzi, eds., *Experience, abstraction and the scientific image of the world: Festschrift for Vincenzo Fano*. Franco Angeli editore. Accessed 3 September 2022 at arXiv:2007.05300.
- Rovelli, C., 2022a. Back to Reichenbach. Preprint accessed 3 September 2022 at <http://philsci-archive.pitt.edu/20148/>
- Rovelli, C., 2022b. Memory and entropy. *Entropy* 24, 1022. Accessed 3 September 2022 at arXiv:2003.06687.
- Russell, B., 1913. On the Notion of Cause. *Proceedings of the Aristotelian Society, New Series* 13, 1–26.
- Ryle, G., 1949. *The Concept of Mind*. Hutchinson.

- Sellars, W. 1949. Language, Rules, and Behavior, reprinted in *Pure Pragmatics and Possible Worlds — The Early Essays of Wilfrid Sellars*, Jeffrey F. Sicha (ed.), Ridgeview Publishing Co; Atascadero, CA; 1980.
- Sellars, W., 1958. Counterfactuals, dispositions, and the causal modalities. In H. Feigl and M. Scriven (Eds.), *Minnesota Studies in the Philosophy of Science vol. 2*, pp. 225–308. Minneapolis, MN: University of Minnesota Press.
- Sellars, W., 1962. Philosophy and the scientific image of man. In *Frontiers of Science and Philosophy*, ed. Colodny, R. G., pp. 35–78. University of Pittsburgh Press. [Reprinted in: *Science, Perception and Reality* by W. Sellars (1963, Routledge & Kegan Paul)].
- Sellars, W. 1975. Autobiographical Reflections (February 1973). In *Action, Knowledge, and Reality: Studies in Honor of Wilfrid Sellars*, H-N. Castañeda (ed.), Indianapolis: Bobbs-Merrill, 277–293.
- Smolin, L., 2013. *Time Reborn: From the Crisis in Physics to the Future of the Universe*. Houghton Mifflin Harcourt.
- Stalnaker, R., 1968. A theory of conditionals. In Harper, W.L., Stalnaker, R., Pearce, G. (eds) *Ifs. The University of Western Ontario Series in Philosophy of Science, vol 15*. Springer, Dordrecht, 41–55. https://doi.org/10.1007/978-94-009-9117-0_2
- Storer, T., 1951. On defining 'soluble'. *Analysis* 11: 134–37.
- Timpson, C., 2008. Quantum Bayesianism: a study. *Studies in History and Philosophy of Science Part B: Studies in History and Philosophy of Modern Physics*. 39 (3): 579–609.
- Toulmin, S., 1950. Probability. *Proceedings of the Aristotelian Society, Supplementary Volume*, 24, 27–62. <https://doi.org/10.1093/aristoteliansupp/24.1.27>
- Varzi, A.C., 2020. Counterpart theories for everyone. *Synthese* 197, 4691–4715. <https://doi.org/10.1007/s11229-020-02720-1>
- von Uexküll, J., 1934/1957. A stroll through the worlds of animals and men: A picture book of invisible worlds. In: *Instinctive behavior: The development of a modern concept*, ed. & trans. Schiller, C. H.. International Universities Press (1957).
- Wiener, N. 1964. *Ex-Prodigy: My Childhood and Youth*. MIT Press.
- Williams, D., 2018. Pragmatism and the predictive mind. *Phenomenology and the Cognitive Sciences*, 17, 835–859.
- Williams, D. C., 1951. The Myth of Passage. *Journal of Philosophy* 48(15): 457–71.
- Wittgenstein, L. 1930. MS107, as catalogued in von Wright, G.H. (1993), 'The Wittgenstein Papers', in J. Klagge & A. Nordmann (eds.), *Ludwig Wittgenstein. Philosophical Occasions 1912–1951*, (Indianapolis, Hackett), 480–510.
- Woodward, J., 2003. *Making Things Happen: A Theory of Causal Explanation*, Oxford: Oxford University Press.
- Wright, C., 1993. Realism: The Contemporary Debate—W(h)ither Now?. In Haldane and Wright (1993), 63–84.