

The practical arrow

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Abstract: Ismael traces our sense that the past is fixed and the future open to what she calls 'the practical arrow' – 'the sense that we can affect the future but not the past.' In this piece I draw a sharper distinction than Ismael herself does between agents and mere observers, even self-referential observers; and I use it to argue that Ismael's explanation of the practical arrow is incomplete. To explain our inability to affect the past we need to appeal to our own temporal orientation as agents, and not merely to the ingredients from physics that allow us to predict the consequences of our actions.

Ismael wants to explain our sense that the past is fixed and the future open. Some writers propose that this is epistemic: 'On such a view, the sense of openness comes from the fact that we know less about the future.' Ismael follows Penrose in rejecting this view.

Penrose considers and (rightly I believe) rejects this [view]. He writes: "the direction of psychological time ... is not just a question of the past being (apparently) more certainly knowable than the future ... It is not the ease in inferring the past that is relevant here, but the feeling that the past is unchangeable. ... it is not the difficulty that we might have in guessing ... the future that concerns us, but the feeling that we can affect [it] ..." (Penrose, 594-596) (Ismael, xx; throughout this piece I use underlining for my own emphasis added in quotes)

Put this way, the past–future asymmetry is a *causal* rather than merely *epistemic* matter. We take ourselves to have *control* over some of the future, but not the past.

Ismael calls this *the practical arrow*. She argues that to explain it, we need to put ourselves in the picture, in some sense. What does this involve? At points, she seems to suggest that adding *self-reference* to the epistemic picture is sufficient.

Taking self-reference into account

I am going to suggest that the problem with the epistemic reading is that it doesn't take into account that we are a part of the universe and our knowledge-gathering activity is itself connected in the world that it represents. Instead of suppressing interference and treating ourselves as observers outside the universe, let's see what happens if we take it into account ... (Ismael, xx)

(More below on what's meant by 'interference'.) Later, Ismael says that 'when it comes to understanding time as we know it, we need to abandon the fiction that we are outside the world.' We need to view ourselves as 'a part of the universe, not a spectator, but one of the players on the field.'

In these comments, I want to pay more attention than Ismael herself does to the distinction between mere spectators, self-referential or not, and genuine players, or agents. The distinction matters because, as I think Ismael agrees, it is the agent's viewpoint that's crucial to understanding our sense that we control the future. The remarks above might suggest that Ismael takes self-reference to yield this agential viewpoint, when added to the 'knowledge-gathering' epistemic viewpoint. If so, I disagree: I think that agency requires a functional organisation that mere observers, even self-observers, might not possess. A

spectator doesn't become a player simply by wandering onto the field, even if he (it is usually a he) starts taking selfies with the team.¹

This point about the spectator/player distinction isn't a real disagreement, I think. I'm simply making explicit something that Ismael presupposes. But at the end of this note I'll use it to make a more substantial point. I think there's an ingredient missing in Ismael's account of the practical arrow. She hasn't explained why we can't affect the past. For that, I'll argue, we need the time-asymmetry of agents themselves.

First, three brief pieces of history – a selection of authors who highlight the observer/agent distinction, in work on causation. The first piece, appropriately, is self-referential.

1. Menzies and Price (1993)

Peter Menzies and I once argued that causation should be understood in terms of what we called 'agent probabilities' – probabilities *as assessed from an agent's perspective*. We claimed that such probabilities may differ from those assessed by a third-person observer, and that this enabled our view to escape difficulties that plague other probabilistic approaches to causation, such as the problem of 'spurious correlations' (Hitchcock 2021). Why had this option been missed?

We take the fact that the virtues of agent probabilities have been overlooked by orthodox probabilistic theories [of causation] to be an unfortunate legacy of the observation-oriented empiricism which Hume bequeathed to subsequent discussions of causation. Given this orientation, the Humean tradition takes for granted that causation is to be analysed in observational terms. ... In our view [the lesson of spurious probabilities is that] the Humean strictures are too severe. Empiricists need to keep in mind that human subjects have access to the world in two ways: as observers, certainly, but also as *agents*, capable of intervening in the ... world at will. (Menzies & Price 1993, 191)

My present issue is whether self-reference reduces these two modes of access to the world to one. Is a self-referential observer necessarily an agent?

2. Dummett (1964)

If the answer to that question were 'No', would it follow that a self-referential observer could not achieve enough of the causal viewpoint to give Ismael Penrose's asymmetry between future and past? *Pace* Menzies and me, perhaps causal thinking doesn't depend on agency? One author who proposes that it might not is Michael Dummett, in the introduction to 'Bringing about the past' (Dummett 1964). Dummett's main issue – Could we conceivably affect the past, and if not, why not? – will be relevant later, but for the moment I'm interested in the distinction he draws between agents and mere observers.

There is indeed an asymmetry in respect of past and future in the way in which we describe events when we are considering them as standing in causal relations to one another; but I am maintaining that this reflects an objective asymmetry in nature. I think that this asymmetry would reveal itself to us even if we were not *agents* but mere *observers*. It is indeed true, I believe, that our concept of cause is bound up with our concept of intentional action: if an event is properly said to cause the occurrence of a subsequent or simultaneous event, I think it necessarily follows that, if we can find any way of bringing about the former event (in particular, if it is itself

¹ Cf. Ismael's '[s]ophisticated cognitive agents ... self-consciously choosing actions with an eye to the records they will create.'

a voluntary human action), then it must make sense to speak of bringing it about *in order* that the subsequent event should occur. Moreover, I believe that this connection ... plays an essential role in the fundamental account of how we ever come to accept causal laws: that is, that we could arrive at any causal beliefs only by beginning with those in which the cause is a voluntary action of ours. Nevertheless, I am inclined to think that we could have some kind of concept of cause, although one differing from that we now have, even if we were mere observers and not agents at all—a kind of intelligent tree. And I also think that even in this case the asymmetry of cause with respect to temporal direction would reveal itself to us. (1964, 338)

The concept of cause Dummett thinks that mere observers might possess is linked to explanation. He notes that ordinary patterns of explanation show a strong temporal asymmetry, and suggests that the direction is contingent; we can make some sense of creatures who discover that in their environment, an explanatory event typically occurs *later* than what it explains. In effect, he is imagining creatures whose own temporal sense runs counter to the prevailing thermodynamic asymmetry in their world. We might object that such agents would be physically impossible, but I don't think this matters for Dummett's purposes. We could imagine that the intelligent trees live in a simulation, not subject to the actual laws of physics, or that they are observing a virtual world.

If we imagine ourselves as intelligent trees observing such a world and communicating with one another, but unable to intervene in the course of events, it is clear that we should have great difficulty in arriving at causal explanations that accounted for events in terms of the processes which had *led up to* them. The sapling grows gradually smaller, finally reducing itself to an apple pip; then an apple is gradually constituted around the pip from ingredients found in the soil; at a certain moment the apple rolls along the ground, gradually gaining momentum, bounces a few times, and then suddenly takes off vertically and attaches itself with a snap to the bough of an apple tree. Viewed from the standpoint of gross observation, this process contains many totally unpredictable elements: we cannot, for example, explain, by reference to the conditions obtaining at the moment when the apple started rolling, why it started rolling at that moment or in that direction. Rather, we should have to substitute a system of explanations of events in terms of the processes that led back to them from some subsequent moment. (1964, 339)

In sum, Dummett holds that there is a thin notion of causation that even a mere observer might possess, but that the full notion of causation does depend on agency, in the sense that we could arrive at it only via our experience as agents. And, helpfully for my main point, Dummett takes for granted that there is a difference between agents and mere observers. Our present question is whether self-reference gets us from being the latter to being the former.

3. Ramsey (1929)

In his late piece 'General propositions and causality' (Ramsey 1929; hereafter GPC), Ramsey touches on the question of the difference between past and future.

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 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. Again from the situation when we are deliberating seems to me to arise the general difference of cause and effect. We are then engaged not on disinterested knowledge or classification (to which this difference is utterly foreign), but on tracing the different consequences of our possible actions, which we naturally do in sequence forward in time, proceeding from cause to effect not from effect to cause. We can produce A or A' which produces B or B' which etc. ...; the probabilities of A, B are mutually dependent, but *we* come to A first from our present volition. ... In a sense my present action is an ultimate and the only ultimate contingency. (GPC 145–46)

We'll return to the source of the difference between past and future, on Ramsey's proposal. For the moment, let's note the distinction he draws between 'disinterested knowledge or classification', on the one hand, and 'tracing the consequences of possible actions', on the other. Ramsey has already introduced this distinction earlier in GPC:

When we deliberate about a possible action, we ask ourselves what will happen if we do this or that. If we give a definite answer of the form 'If I do *p*, *q* will result,' this can properly be regarded as a material implication or disjunction 'Either not-*p* or *q*.' But it differs, of course, from any ordinary disjunction in that one of its members [i.e., *p*] is not something of which we are trying to discover the truth, but something it is within our power to make true or false. (GPC 142)

In effect, Ramsey is distinguishing two relations each of us may bear to a proposition P (see Figure 1). P may be an object of *Enquiry*, when we seek to *find out* whether P. Or it may be an object of *Decision*, when we take ourselves to be able to *decide* that P – to 'make it so', in the words of Star Trek's Captain Picard.

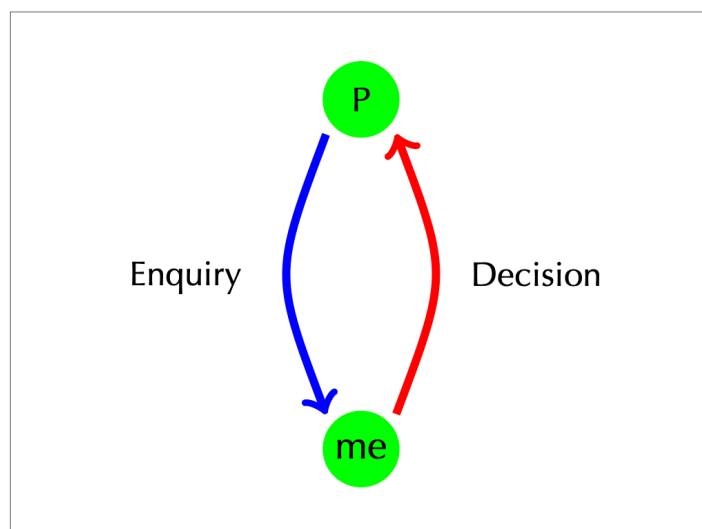


Figure 1. Two ways of knowing that P

In familiar jargon, Enquiry and Decision have different *directions of fit* – that’s what the arrows in Figure 1 represent. In Enquiry, I try to fit my belief to the world; in Decision, I try to fit the world to my mind – to how I want, or decide, that the world should be.²

Back now to our main question: does adding self-reference to Enquiry get us to Decision? To show that it does not, I want to develop an example. Its point is to focus our attention on the question of *what it takes* to make the step from being a mere spectator to being a player, or agent. We could have used Dummett’s intelligent trees, and imagined them acquiring agency in some way. But trees have a limited behavioural repertoire.³ For us, it will be more helpful to imagine passive observers with a human behavioural repertoire.

4. Extrapolating angels

In Wim Wenders’ beautiful film, *Wings of Desire*, two of the central characters are angels, Damiel and Cassius. The movie is set in Berlin in the 1980s, though Damiel and Cassius are immortal, inhabiting the region since long before there were humans, let alone Berliners. They are invisible to humans (except to children, a complexity I’ll ignore), and have no direct influence on the material world. But they hear the thoughts of humans, and try to provide comfort to those who are troubled. This may have indirect influence on the material world, apparently, if humans act differently as a result – Cassius tries unsuccessfully to prevent someone from jumping off a bridge. They also have the option of becoming human themselves, another complexity I’ll set aside here. (Damiel chooses to do so after falling in love with a trapeze artist.)

In my version, Damiel and Cassius are mere spectators, cataloguing events in the material world, including its human occupants. It is easy to imagine that there might be limitations to their ability to extrapolate at any given moment – they are angels, after all, not gods – so that the future that comes into view is often unexpected. Perhaps humans turn out to be particularly unpredictable, given to changing their minds at the last minute, as Ismael describes. Nevertheless, the angels’ relation to the material world remains on the Enquiry side, with (angelic) mind to (material) world direction of fit. The angels have no preferences or desires concerning the material world whatsoever (not even for trapeze artists), and they make no material-world Decisions.

To move towards self-reference, let’s add that each angel sits on the shoulder of a particular Berliner. Their interest is in predicting the behaviour of their own particular human, but still as passive spectators. Again, angelic mind to material world direction of fit.

Let’s add some feedback. Let’s suppose that having an angel on one’s shoulder does affect the behaviour of some Berliners, though in ways the angel cannot predict. Perhaps the predictions discombobulate the associated Berliner in some way, spinning the internal dice that determine how she behaves. Some of the angels’ predictions then produce *interference*, in Ismael’s sense: the predictions undermine themselves. This makes angel mind to material world fit more difficult, but doesn’t introduce any material world to angel mind direction of fit. The angels still have no material-world agency of their own, or preferences to drive such agency.

As a final step, imagine a mind that stands to its own body the way these angels stand to their individual Berliners.⁴ Such an entity is not what the physicist Jim Hartle (2005) calls an IGUS – an *information*

² This doesn’t mean that Decision doesn’t also yield knowledge. But it is a special kind of knowledge, for which, as Ismael herself puts it, we hold an epistemic ‘wild card’ (2011, 161).

³ Should I turn over a new leaf? Do I dare to make a peach? The imagination soon runs dry!

⁴ We can get close to this from our own experience, if we know what it is like to feel severely depressed.

gathering and utilising system. On the contrary, it is an IGNUS – an information gathering but *not* utilising system. This IGNUS is like Dummett’s intelligent trees, except that it has a richer repertoire of behaviour. This means that there is plenty of self-information for its observing mind to acquire, and scope for discombobulation and interference.

5. Ismael on the practical arrow

Back now to Ismael’s piece. This is what she says about the practical arrow.

[L]et’s go back to the epistemic arrow of time and see whether we can illuminate the practical arrow. By the practical arrow, I mean the sense that we can affect the future but not the past, i.e., that what you do in the here and now action in the here and now makes a difference to the future but not the past. It turns out that the practical arrow is just the flip side of the epistemic arrow.

By the epistemic arrow, Ismael means the fact that we know a lot more about the past than the future, because physics gives us *records* of the past. She summarises the ingredients from physics on which such records depend, and then continues:

We consider an agent looking into a future about which she knows only the kinds of general things that can be derived from those ingredients [from physics] and we ask: what should she expect the future to be like, conditional on some macroevent of the kind that we ordinarily take to be under voluntary control. So we ask what should she expect if she, for example, walks across a sandy beach, drops an ice cube into a glass of water, or scrapes her knee? ... We find that she can form some relatively reliable expectations. ... If she walks across a sandy beach, she will leave footprints.

Ismael speaks here of an *agent*, and of *voluntary control*, but so far, the questions her agent is asking could also be asked by our IGNUS. Sandy beaches are uncommon in Berlin, but that complication aside, there is nothing to prevent our angels asking what will happen if their own human walks across one.

However, the IGNUS cannot do what Ismael describes next. The passage continues:

An intelligent agent will exploit this strategically, choosing her actions with an eye to their expected results. That’s what intelligent agency is: acting with foresight and letting the expected results guide your actions.

IGNUSs are not agents – acting and choosing are not in their repertoire. Ismael then asks:

How do things look to an agent like this over time as she makes choices and acts? Exactly as you’d expect: the future is a field of open possibility transformed into the thin hard line of fact by decisions.

Again, my point is simply that this viewpoint is not available to a mere observer, even a self-referential observer. That’s what the IGNUS shows us.

Notice that in deriving the practical arrow, ... I drew inferences that depend only on the thermodynamic gradient. I assumed no causal arrow. The only thing that I’ve added to the ingredients [from physics] above is the observation that embodied knowledge is not detached but engaged. It has interference effects and [the agent] exploits them. It exploits them in the most direct way by anticipating the immediate results of its actions and in [an] indirect way in the

wider landscape, using its actions to forestall, avoid and deter things it doesn't like and promote, encourage, arrange and facilitate ones that it does.

Once again, I agree, except that I want to say that Ismael has also added, or rather presupposed, the step from mere observation to agency. An IGNUS has non-detached knowledge, too, but is not the right kind of entity to exploit this knowledge, in the way here described. For this reason, it will lack Penrose's sense that it *controls* the future. Control simply isn't one of its words.⁵

6. Bringing about the past?

So far, I have been making explicit something I think is implicit in Ismael's account. The practical arrow, and the sense of the difference between past and future that depends on it, rests on our perspective as *agents*, not merely our perspective as *observers* (even self-referential observers). To finish, I want to explain how this seems to lead to a substantial disagreement.

Ismael's practical arrow is intended to be an asymmetry between past and future – as she puts it, 'the sense that we can affect the future but not the past.' Explaining the practical arrow thus involves two components, explanations (i) of the sense in which we *can* affect the future, and (ii) of why we *can't* in the same sense affect the past. Ismael is persuasive about (i), but in my view doesn't pay enough attention to (ii).

Concerning (i), Ismael says this:

[I]nterference effects ... run in the future direction for the same reason that records carry information about past. The interference effects of one's actions are precisely records of their occurrence.

But if we are careful to stipulate that the use of the term 'effects' does not carry any in-built implications about the causal arrow, then it is natural to raise Dummett's question: Why shouldn't an agent act for the sake of past ends? As Ramsey saw, we can't simply take it for granted that our actions are independent of past events – in some sense, they are clearly not.

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)

To understand Ramsey's point, think again about our IGNUS, and the angels from which we derived it. From an angel's point of view, the behaviour of a Berliner may well be a sign of the past. Her choice of a particular kind of doughnut may be a sign of a Berlin childhood. In *Wings of Desire* it would make perfect sense for Damiel to *hope* that his beloved will choose a doughnut – thereby revealing that she is a native Berliner – if he does not already know whether she is or not. But things look different from her own point of view. It doesn't make sense for her to choose a doughnut to make this the case (even if she has forgotten where she grew up).

Why are the probabilities different from the agent's point of view? Ismael certainly has the resources for answering this question, because interference is important, at least in some cases. Choosing a doughnut in order to have grown up in Berlin would undermine the usual correlation between doughnut preferences and birthplace (Price 1991).

⁵ Again, imagine the viewpoint of someone who is severely depressed.

My point is that we need such a story to give us (ii), as well as (i). The challenge for Ismael I want to leave on the table is that this requires us to pay attention to the temporal orientation of *agents themselves*. We don't get it simply from the evidential connections we get from physics – they work in both directions (albeit in ways that are the mirror image of each other, as least in the kind of picture that Ismael describes). What breaks the connections in one temporal direction – for us, what we call the past – is that the deliberation happens on that side of the action.

7. Causation and Humean correlation

The point may be easier to see if we ask what adds time-asymmetry to bare Humean regularities, in accounts of causation in the spirit of Ramsey's GPC and (Menzies & Price 1993). In such accounts, causes are variables imagined under the control of a deliberating agent.⁶ Effects are variables correlated with these controlled variables, *where the correlation survives when the first variable is controlled by an agent*. (That isn't true of 'spurious correlations' – that's the point.)

Now imagine a Humean regularity, say between a Berlin childhood (BC) and a doughnut craving (DC) later in life. Is there a causal connection, and if so in which direction? To settle the issue, we consider the cases in which an agent *chooses* to produce BC, and *chooses* to produce DC.⁷ Given our temporal orientation as agents, this involves putting ourselves into the picture *before* the variable in question, in each case. Let's suppose that when we put ourselves into the picture before BC – i.e., as we would ordinarily say, when we *choose* to raise a child in Berlin – DC later in life is a reliable co-occurrence. So the BC-DC correlation continues to hold, in this case: BC does cause DC.

What about when we choose to produce DC directly? In this case, what lies in the immediate past of DC – again, it has to be the past, given our own temporal orientation – is our own action, inducing a doughnut craving in an experimental subject in some way. There is now no guarantee that DC is preceded by BC. Our *intervention* breaks the normal BC-DC correlation.⁸ So adult doughnut cravings are not a cause of Berlin childhoods, despite the observed correlation between these things.

Thus the usual temporal orientation of the causal relation reflects that of agents like us. Our own temporal orientation no doubt reflects that of the prevailing thermodynamic asymmetry on which our existence depends, so that it is no accident that the practical arrow turns out to align with the thermodynamic arrow, as in Ismael's picture. But the detour via our own de facto asymmetry as agents nevertheless plays an essential role. Without it, we can't explain why we can't affect the past (in normal circumstances). In any case, there's nothing to prevent us exploiting the imaginative liberties that Dummett takes with his intelligent trees. We can imagine agents intervening in a virtual environment in which the thermodynamic asymmetry is the reverse of their own. In this case the practical arrow and the thermodynamic arrow do not run parallel.⁹

⁶ Perhaps a highly idealised agent, a step that leads in the direction of the interventionist approach of Woodward (2003) and Pearl (2000).

⁷ Set aside the practical and ethical difficulties that the experiment would involve!

⁸ I use the term 'intervention' deliberately here, though it is given a somewhat more precise sense in so-called interventionist approaches to causation (Woodward 2003). I have argued (Price 2017) 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.

⁹ In (Price 1996, 145–146) I made this point by imagining God intervening from the future.

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