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Choosing between the long and short informational routes to psychological explanation

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Following recent work by Don Ross (Ross, 2000; Ross & Spurrett, 2004), I contrast the influential theories of Daniel Dennett and Paul Churchland in information-theoretic terms. Dennett makes much of the fact that the morphological shorthand which emerges before a witness as she looks upon cohesive aggregates of matter commands some measure of predictive power. This, for him, speaks against eliminating recourse to an intentional vocabulary. By contrast, the eliminative materialism defended by Churchland does not gloss such informational compressibility as an explanatory desideratum, and thus regards the informational noise which accrues at higher levels of description as patently unacceptable. Yet, since it is unlikely, as Ross, Ladyman, and Collier (2007) have recently suggested, that anything remains once we subtract the appeal to patterns, I argue that the ubiquity of informational compression in scientific explanation seriously undermines the claim that talk of the mental could be eliminated.

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1. Introduction

Daniel Dennett and Paul Churchland disagree about whether intentional talk is dispensable. Most studies, however, have tended to gloss this as a straightforward disagreement over the ontology of the mental as such. Upon further scrutiny, though, we find that the situation is more subtle, especially when we consider Dennett's (2006) rejection of qualia and promotion of empirical science—features wholly consonant with Churchland's (2005) position. Following recent work by Don Ross (Ross, 2000; Ross & Spurrett, 2004), then, I want to flesh out the specific differences at play in information-theoretic terms, an avenue that sheds more light on the tangible issues involved.

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Dennett makes much of the fact that the morphological shorthand which emerges before a witness as she looks upon cohesive aggregates of matter commands some measure of predictive power. This, for him, speaks against the prospect of ever eliminating recourse to an intentional vocabulary. However, to the extent the eliminative materialism defended by Churchland stays true to its central commitments, it cannot gloss such informational compressibility as an explanatory desideratum, and must regard the informational noise which accrues at higher levels of description as patently unacceptable. Yet, since it is unlikely, as Ross, Ladyman, and Collier (2007) suggest, that anything would remain were we to ban the appeal to patterns, I argue that the ubiquity of informational compression in scientific explanation generally shifts the argumentative balance in favor of Dennett's views.

I will defend this conclusion in a three-step fashion, with sharp turns at each step. I will begin by giving a neutral account of Dennett's views (section 2). I will then articulate a critique of those views that is consistent with Churchland's philosophy of mind (section 3). Finally, calling on recent work in the philosophy of natural science, I will attempt to vindicate the starting position by showing how implausible the eliminativist critique really is (section 4).

2. Two Routes

Dennett regards the ascription of motives and beliefs as a heuristic device which is nevertheless objective, in that we can robustly gauge whether it renders its predictive service. As he puts it: "the decision to adopt the intentional stance is free, but the facts about the success or failure of the stance, were one to adopt it, are perfectly objective" (1987, p. 24). But, given that Dennett stresses that advantageous concordance with folk-psychological expectations is "all there is" to having beliefs (1987, p. 29), one might ask what warrants his use of the label "objectivity." In fairness, the term usually means more than the determinate assessability of an idea's efficacy (Robinson, 1995). Rightly or wrongly, then, the strangeness implicit in Dennett's talk of "stances" has been perceived as a major weakness for his account of mind—a disingenuous cop-out that effectively dodges the thorny ontological issues it raises. As Fodor cynically remarks, "the great virtue of instrumentalism . . . is that you get all the goodness and suffer none of the pain" (1990, p. 6). "Real patterns" (Dennett, 1991) represents Dennett's attempt to meet this challenge head on, recasting his position so that it turns less prominently on considerations of instrumental utility and more on concerns for material adequacy.

Dennett presents a battery of examples in support of his view, so it will be useful to latch onto the one that brings out most clearly the contrast with eliminative materialism I want to exploit, to wit, the celebrated "Game of Life" setting. The general idea, to recap, is that a primitive set of axioms or "rules" deployed on a two-dimensional grid of cells can give rise to more or less cohesive patterns which a third-party observer could categorize with some regularity. As Dennett emphasizes, the

sundry morphological types which emerge before a witness command some measure of predictive power. If one has ascended to a level of description sufficiently abstract for the relative salience of a pattern to be a reliable tracker of ''pseudo'' agency, then one can tell, for instance, that a ''glider'' is about to fall prey to an incoming ''eater.'' According to Ross' (2000, p. 161) systematic reconstruction of Dennett's (by design, cryptic) remarks, a pattern is real if it meets the following two conditions:

(1) It is projectible under at least one physically possible perspective, and
(2) It encodes information about at least one structure of events or entities S where that encoding is more efficient, in information-theoretic terms, than the bit-map encoding of S, and where for at least one of the physically possible perspectives under which the pattern is projectable, there exists an aspect of S that cannot be tracked unless the encoding is recovered from the perspective in question.

Of crucial importance here is the epistemological shift which occurs when one adopts a macroscopic ''intentional stance.'' There is, on the one hand, a base level where all one countenances are the cell pixels themselves, considered as immanent particulars. Since there is a one-to-one correspondence between a viewer's representations and the discrete cells that are either ''on'' or ''off,'' the information-theoretic depiction is appropriately called a ''bit-map'' (literally, a ''map of binary digits''). This robustly charts an area with a degree of accuracy proportionate to the number of divided squares. Given an exhaustive statement of the initial conditions of the game—that is, of the (finite) rules and starting positions of the (finite) pieces on the grid—one could thus in principle deduce (in Laplace-like fashion) the various positions these will occupy on the board as the discrete volleys of moves or ''ticks'' are repeatedly implemented. The inferential process underwriting such a systematic forecast would be completely monotonic or truth-preserving: working with a bit-map is informationally onerous, but assuming that the governing laws do not change midway, it yields a predictive output that is as secure as its input. Call this the ''long route'' to psychological explanation.

The inferential dynamic at work is radically different, however, when one adopts the intentional stance. Indeed, if one ascends to a higher level where creature-like actors can be discerned on the playing field, one does so at the price of turning to an inductive rationale of a far less mechanical character. Although his focus in ''Real patterns'' is directed more at the ontological implications of this shift than its epistemological workings, Dennett is forthright about the fact that a concession along these lines needs to be made in order to have access to intentional explanation. Whereas an exhaustive account of the pixels' dispersion on the grid is a robust affair, moving away from a bit-map and limning ''abstracta'' (Dennett, 1991, p. 28) like ''eaters'' involves a generalization from particulars which effectively soils the truth-preservation with informational noise. This allows one to draw predictions only ''sketchily and riskily'' (Dennett, 1991, p. 40). A considerable boon of yielding to induction, however, is that it provides one with assorted heuristics that are unavailable when one countenances only the pixels themselves. ''What realist special scientists do on this view, then, is seek to find real patterns in particular domains of

reality, domains defined by sets of particular structures and/or processes at some level of abstraction from fundamental physics" (Ross & Spurrett, 2004, p. 614). Call this the "short route" to psychological explanation.

To make the difference between these two approaches vivid, we might imagine having to "text" another person's demeanour and location at a given instant with a mobile phone. If one were to take the bit-map route and catalogue the position and velocity of all the person's constituent particles, this would make for a lengthy message (and run a costly bill). In information-theoretic parlance, the message would have greater "entropy." But, if one were to type something along the lines of "so and so is sitting in such and such a room doing this or that," one would thereby spare oneself a lot of bits (not to mention a lot of money). On this view, the configuration of all the relevant neurons in a given brain state need not be exhaustively recounted to get a sense of what the subject is thinking/feeling. That is the major difference between the short and long route to psychological explanation, at least from the information-theoretic perspective under examination. "On this view, the objects over which the sciences generalize are rendered into two sets: [compressed] abstracta, the domain of the special sciences, and [enumerated] illata, the domain of physics" (Ross, 2000, p. 156).

3. Choosing the Long Route

Let us now shift gears and ask: given her commitments, can an eliminative materialist truly make this transition from the monotonic to the non-monotonic so as to accede to explanations of lesser entropy? More to the point, is the informational compressibility involved in the intentional stance—no matter how cognitively cost-effective—sufficient to sway a thinker like Churchland into countenancing things (like "eaters" or "angry people") whose ontology is, at root, "more" than merely material?

Playing up the convergences with eliminative materialism, Dennett insists that "one belief that is shared by all the representatives on the spectrum I am discussing is that 'folk psychology' provides a description system that permits highly reliable prediction of human (and much nonhuman) behavior" (1991, p. 42). This gloss, alas, is only partially true. Contrary to Dennett's portrayal, Churchland's account resists the idea that adopting intentional talk is indispensable from an explanatory point of view. To understand why that is, it is important to bear in mind that Churchland's philosophical commitments are twofold.

Churchland is of course well-known for his adherence to eliminativism, which is far more radical than the standard fare of reductionism. But, when he talks of a completed neuroscience doing away with psychology altogether (Churchland, 1996), he is not merely emphasizing his optimism for science or "playing a hunch," as Dennett uncharitably claims (1991, p. 51). The substantive point behind Churchland's repeated appeals to an asymptotic end of enquiry is rather that (a) such a "complete" account would provide us with a gap-free explanatory scheme,

and that (b) this is the ideal we should strive to attain. Hence, the non-monotonic noise characteristic of intentional psychological accounts may provisionally accompany empirical science as it marches forward, but there is no place for it in the end-state envisioned by Churchland.

This call for elimination flows from the other half of Churchland's position, to wit, his materialism. Although Dennett considers informational noise to be a relatively benign side-effect of attaining more generalized levels of description, it can also be seen as a telltale sign that one has departed from the material order. The reasoning here is simple enough: matter—construed by the materialist as the very stuff of the real—knows no ambiguity or distortion. Or, conversely: ''noise'' is an epistemological concept, if anything is. Accordingly, an eliminative materialist need not be impressed by the explanatory benefits that ensue from adopting the intentional shorthand championed by Dennett, especially if these benefits exact an irrevocable compromise with the aforementioned thesis that matter is exclusively what there is.

Consider the bit-map account chastised by Dennett as being ''cumbersome'' (1991, p. 51). Shying away from any recourse to ampliative inference, the eliminative materialist could simply *enumerate* the individual pixels of the Game of Life which a third party espousing the intentional stance has the liberty to coalesce and taxonomize. Granted, ''posing fanciful interpretations'' (Dennett, 1991, p. 41) spares one the tedious task of having to describe the domain in question one atomic unit at a time. That said, such a token-only approach is by far the surest way to ensure that one's theoretical account hugs the metaphysical makeup of the world as closely as possible. So, contrary to Dennett's unfavorable characterization, enumerating a bit-map representation can also be seen as a very attractive approach. The theorist who sticks to a bit-map level of description may be a tortoise to Dennett's hare, but she is certain to get to her destination safely, without straying from the world. The short route can issue no such guarantee.

To be sure, the strict one-to-one ratio between explanans and explanandum involved in a bit-map account is in many ways impractical. This reproach, however—and the intentional realism concomitantly offered as a palliative—have traction only if one makes the cognitive economy a desideratum capable of overruling the commitment to materialism. Dennett has no quarrel with the lower-level explanations of, say, neuroscience. But, since his appreciation of higher-level pattern discernment tells him that material description is not the end of the story explanation-wise, he thinks neuroscience should not be the end of the story of ontology-wise. Dennett may have no qualms about relaxing his metaphysical outlook to accommodate this informational compressibility; but the same clearly cannot be said of Churchland. In the final analysis, then, what sets eliminative materialism sharply apart from the intentional stance is that—as a matter of principle—it does not give *any* weight to considerations of cognitive economy.

Now one might rightly ask why the short route to psychological explanation should be taken to threaten materialism. One deflationary response would be to say: it doesn't—it's all matter out there, and such things go on exactly as they would otherwise. Yet, because on this side of the subject/object divide various options for

conveying information are available, some prove weaker or stronger depending on the aspect under consideration. Informational compression is asymmetrical in that it can result in a loss of data (especially if the domain represented is disorderly). Going back to the example used earlier, from an exhaustive account of another person's material makeup and spatial location, one can infer "who" and "where" (colloquially) they are; but from simply being told that "so and so is sitting in such and such a room doing this or that," one cannot determine the person's exact spatial coordinates. That is the price to pay for engaging in intentional ascription: we save time precisely because we cut corners. This is in many ways a "good" thing, as Dennett rightly notes. The downside is that there is just no way to unpack *all* the observational consequences of a given intentional statement, so in this respect the idiom will always fall short of a complete scientific account (Churchland, 1989). And explanatory completeness, regardless of how many millennia it would require to achieve it, is what Churchland is after.

4. Choosing the Short Route

If the materialist ontology endorsed by Churchland holds water, *then* the grievance just canvassed is cogent. I want to suggest, however, that it is not at all obvious that the antecedent of this conditional deserves to be affirmed. Indeed, one could reply that the informational compression alluded to by Dennett is something *no* science can do without, such that the long route of a thoroughgoing bit-map account is nothing but a chimera of armchair reflection—a relic of early-Modern metaphysics that should be discarded. That, at any rate, is what I shall now argue.

As Ross writes, "to *exist*, is essentially, to persist as a distinguishable entity a long enough period of time that measurement of a set of distinguishing properties is possible using some physically possible property-detector" (2000, p. 163). The truth of this claim becomes apparent when we entertain its negation: an existential posit that would exhibit no regularity whatsoever and would never be discerned under any circumstance could hardly be said to be warranted. Compare this with Peirce who, in a paper originally written in 1886, likewise remarked that:

> The existence of things consists in their regular behaviour. If an atom had no regular attractions and repulsions, if its mass was at one instant nothing, at another a ton, at another a negative quantity, if its motion instead of being continuous, consisted in a series of leaps from one place to another without passing through any intervening places, and if there were no definite relations between its different positions, velocities and directions of displacement, if it were at one time in one place and at another time in a dozen, such a disjointed plurality of phenomena would not make up any existing thing. (1992, p. 278)

Considerations like these have led Ross to carry the lessons of Dennett's proposals over to metaphysics, and to draw the conclusion that "reality is composed of real patterns *all the way down*" (2000, p. 160)—a view he has since developed in greater detail (Ross et al., 2007). Although a full technical articulation of this "information-

theoretic structural realism'' can get complicated, the basic idea that concerns us is that ''the utility of the intentional stance is a special case of the utility of scale-relative perspectives in general in science, and expresses a fact about the way in which reality is organized'' (Ross et al., 2007, p. 199).

The ultimate aim of scientific enquiry is admittedly to arrive at general laws. There are good reasons, however, to think that even this prized achievement is beholden to the ''short route'' previously canvassed. To take an untendentious example from astronomy, we do not exhaustively chart the path and constitution of celestial bodies, pile up the ensuing records in some museum vault, and call that knowledge. Rather, ''the positions of the planets in the solar system over some interval constitute a compressible data set, because Newton's laws . . . supply the necessary algorithm to achieve the compression'' (Davies, 1990, p. 63). To be sure, there has to be a sufficiently high degree of worldly regularity for this feat of massive informational compression to be feasible. Yet, the nomological end-product is so crisp precisely because it leaves out many concrete details and is hedged with ceteris paribus qualifications (Cartwright, 1983). A thoroughgoing ban on noise would therefore halt scientific activity altogether, neurological or otherwise (Horst, 2011).

Once we grant that bit-map explanations are impossible even for basic material objects, we are in a position to ask: what makes the lay person's observation that the sun regularly traces an arc across the sky less legitimate than the scientific observation that, when seen from afar, the earth regularly traces an ellipse around the sun? Natural science having amply proven its worth, the time has come to return the pendulum to a less adversarial resting place and accept that it is no concession whatsoever to geocentrism to acknowledge that the sun *does* set in the West daily. Clearly, to hold that predictions mobilized on the basis of either theory enjoy a privileged status is to express a lingering dogma since, despite their different perspectives, each abstracts out a real pattern.

Now, as far as contingent explanations go, the antics of one's conspecifics are no different. Nevertheless, there is an ingrained philosophical bias against accepting this:

> It may strike you as odd that, whereas instrumentalists hold that belief/desire psychology works so well that we can't do anything without it, eliminativists hold that it works so badly (''stagnant science'' and all that) that we can't do anything with it. . . . In fact—and here's the point I want to stress just now—what largely motivates Anti-Realism is something deeper than the empirical speculation that belief/desire explanations won't pan out as science; it's the sense that there is something intrinsically wrong with the intentional. (Fodor, 1990, p. 11)

With this misguided prejudice removed, intentional explanations of psychological facts gleaned at the scale of the person are no longer suspect (Floridi, 2008, pp. 248–249). Their only difference lies in the varying degrees of informational compression, and this can in principle be rigorously quantified. The autonomy of psychology is nevertheless preserved, since the asymmetrical loss of data that perforce accompanies the ascent to coarser-grained descriptions forbids old-style attempts at reduction (e.g., Oppenheim & Putnam, 1958). In fact, once we grant that all truly

available levels of description involve noise, we can pose the question of whether, for some descriptive and explanatory purposes, a particular lower-level system (say, some model in neuroscience) might actually obscure crucial patterns that are otherwise revealed by a higher-level description, even if such higher-level systems deliberately jettison much detail. For example, some have argued that, by discerning teleonomic attractors, "higher-level accounts are indispensable, because they contextualize the nitty-gritty details found at lower levels" (Schouten & De Jong, 1999, p. 254). The pluralist picture which emerges from this has been aptly dubbed by Ross "rainforest realism." Naturally, Churchland's clear-cutting is not welcomed here.

If no science, physical or otherwise, can desist from the informational demands of the short route, there would no longer seem to be anything "optional" about the adoption of a perspective: to miss what is potentially visible from an intentional vantage is surely to miss relations that truly exist in the world. Accordingly, one might wonder whether the time has come to move away from pluralistic allusions to useful perspectives and freely-elected stances. Although this call for a less permissive branding is legitimate, insofar as the intentional stance swallows the physical stance, an information-theoretic account must nevertheless retain Dennett's general contention that "adopting a stance" toward the world is essential. There are real patterns out there, to be sure; but their discernment—which can be understood as privileging one proper subset among a myriad of others—clearly necessitates that an observer bring her aims, queries, and practical interests to bear on the cognitive transaction (Newman, 1928, pp. 146–147).

Building on a pregnant example from Henry James, we can say that making out a complex figure in a Persian carpet is a joint effort, the subject selecting one shape among others, the object ensuring that that selection is not confabulated, such that "any act of interpretation is a dialectic between...initiative on the part of the interpreter and contextual pressure" (Eco, 1990, p. 21). If, out of some overdone fear of relativism, we hastily cast aside the participatory component at work in this interplay (Peschard, 2010)—which enters most prominently as the surmise that renders further inference possible, literally determining what to look for—we run the risk of lapsing into a naive epistemological account that lacks the resources needed to ascertain what constitutes an appropriate degree of informational compression in a given instance. Indeed, it is worth stressing that we witness the denizens of the Game of Life very much "from within" that game, and are thus players that have a tangible stake in the outcomes of the intentional forecasts marshalled in this aptly-named setting (Van Fraassen, 2002, pp. 82–83).

Sure enough, eliminative materialism and the intentional stance are not wholly unrelated, insofar as Churchland (1981, p. 71) himself was one of the first to insist that folk psychology should be counted as a genuine theory. Of course, he then proceeded to argue (far more controversially) that intentional predicates are nothing but superstitions that add up to a *bad* theory. If, however, the foregoing considerations drawn from recent philosophy of science are correct, and the short

route of informational compression is one even lower-level enquiries like physics must take, then the strategic merit of evincing eliminative materialism's commitment to strictly noise-free explanation is that it reveals the implausibility of its core aspiration to do away with intentional explanations of psychological phenomena.

Acknowledgements

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