

Critical Notices

The Dappled World: A Study of the Boundaries of Science. NANCY CARTWRIGHT. Cambridge: Cambridge University Press, 1999. Pp. ix, 247.

We all know how important it is to be wary of headlines. A sensational book title by Nancy Cartwright in 1983 offered to explain *How the Laws of Physics Lie*. But in the end it turned out that, actually, only some laws lie, and, as it happens, only laws construed in a particular way. The headline writers are back: we live in dappled world, it seems, characterized by a patchwork of laws.

The challenge of *The Dappled World* is to filter out its more unqualified slogans, and to expose thereby a genuinely provocative and (to my mind) highly intuitive, potentially compelling picture of the world and various sciences which attempt to map it. One could be forgiven for failing to engage with this picture, for it is overshadowed by the rhetoric of more strident claims. After successful filtration, however, several of the core ideas are revealed as issuing an account of subjects of great importance to both philosophers of science and metaphysicians: the nature of laws, and the importance of dispositional properties, or 'capacities'.

Cartwright argues for three central, closely connected theses: laws (and theories) are not universally applicable; laws are true only *ceteris paribus*; and our most wide-ranging scientific knowledge concerns not laws at all, but rather the *natures* of things—that is, the capacities things have as a result of possessing certain features or properties. Even our best laws are highly limited in scope, applying only to very specific arrangements of things ('nomological machines') which give rise to precisely those regularities described by these laws. Thus, laws only hold so long as such arrangements are in evidence and can be shielded effectively from interfering factors. For any given arrangement, we may if successful construct a model for the various capacities of the system, capacities which may in other circumstances be found in different combinations, thus generating different laws in different situations. Laws are not, therefore, properly regarded as basic tools with which to account for the behaviours of things in the world. Rather, capacities fill this role, and specific laws hold only insofar as things with stable capacities are thrown together in appropriate circumstances.

The primary target of this analysis is a particular sort of realist: the *fundamentalist*. Fundamentalists think that laws are universally applicable; a law 'holds everywhere and governs in all domains' (p. 24). Consider Newton's second law, $F=ma$. Does this law apply to all bodies with mass? Cartwright's scepticism in response to this question stems from what she takes to be an important methodological principle borne of empiricism. Unless we have a model of $F=ma$ which yields correct predictions for the values of these parameters in experimental tests, we have no good reason to believe that $F=ma$ applies. In the case of a falling coin in appropriate surroundings, F may be understood in terms of gravitational attraction, and we have a model for this. In the case of a falling currency note on a blustery day, we cannot apply this model and hope to make accurate predictions. The fundamentalist believes that $F=ma$ applies nonetheless, but that predictions are here complicated by the difficulty of calculating net forces given the influence of the wind. This, says Cartwright, is a prejudice. In the absence of a model that yields accurate predictions, we have no grounds for thinking that *any* particular

law applies. Force is an abstract concept which applies to concrete situations only insofar as particular kinds of forces act. If we can come up with an empirically adequate model for such forces, only then will we have reason to think that a given phenomenon is properly described as an instance of $F=ma$. But this is not a question that can be settled *a priori*. The relevant law in the case of the falling note, if there is one, may appeal to different features of the note and thus different capacities entirely. If the situation is too complex to model and reproduce experimentally as a nomological machine, we may never know.

Cartwright holds that capacities conferred by things like forces can remain stable while laws governing different situations vary. We have no inductive basis for anything resembling fundamentalism. Lacking models with which to describe particular phenomena in such a way as to generate adequate predictions, we have no knowledge of local laws. We are strangers in strange nomological (and possibly non-nomological) machines. Several of the most interesting and controversial aspects of this proposal, however, are little discussed. Some of what is lacking concerns the motivation for adopting Cartwright's picture of radical discontinuity as opposed to something less severe; the rest concerns a lack of attention to the metaphysical details of the proposal, which, together with certain conflations, make the headline conclusions sound more amazing than they really are. Let us consider these issues in turn.

The fundamentalist thinks that $F=ma$ applies to windswept banknotes, even in the absence of a fully articulated model predicting their motion. Is this really a prejudice? We can certainly model the behaviours of various different but less complicated systems. Is it unreasonable to think that cases we *can* model in accordance with $F=ma$ form a continuum with certain other cases which extend beyond our models? If this is not unreasonable, then we clearly do have an *a priori* reason to think that the law applies more widely. This extension of the remit of the law lacks the full support of known, empirically adequate models, as required by Cartwright. But note: in the absence of such models, both the fundamentalist's claim that $F=ma$ applies and the discontinuity theorist's claim that it does not are likewise underdetermined. The absence of models for particular situations rules out neither possibility. In such a climate, *a priori* considerations such as that suggested above are, not surprisingly, taken seriously. The patchwork view is nevertheless preferable, claims Cartwright, for it promotes better methodological choices. The fundamentalist, believing her theory to be complete and universal, may not think to investigate the possibility that different situations incorporate additional capacities. Little reason is given, however, to persuade the reader that this is the case. And in this claim, we see an example of the sort of conflation that leads to the worry of hyperbolic conclusions, which I turn to next.

The fundamentalist, we are told, believes that there is a theory of everything, unifying all genuine laws from all domains of scientific enquiry. This same person also believes that genuine laws are complete, simple, and few in number. These various doctrines are at different points conflated with a belief in the universality of laws. This gives the mistaken impression that by raising doubts about some of these doctrines, Cartwright's central thesis of non-universality is supported. These putative attributes of laws, however, are logically independent. One might consistently deny or remain agnostic about unification, completeness, simplicity, and sparseness, and yet maintain that laws are universal in scope. Whether or not any of the other features obtain, it is certainly possible to distinguish between thinking that a law is universally applicable (to situations involving a

particular property), and holding that it is universally *instantiated*. This points to the most serious of the book's conflations: the fundamentalist is lumbered with a straw man's regularity theory of laws. It is doubtful that anyone who believes that laws are universal holds such a position. If laws comprise a set of generalizations about what regularly happens *simpliciter*, the fact that many or most laws do not correctly describe all situations is a trivial truth.

On Cartwright's picture, barring causal interactions which destroy or alter the features of things which bestow them, capacities are generally stable from one situation to the next, and thus claims about capacities and the tendencies of things that have them are, it turns out, universal. Despite the rhetoric of non-universality, the real story here is a suggestive account of how laws are, in fact, universal. The capacity theorist is a fundamentalist after all. Cartwright's proposal is an *analysis* of laws, not an indictment of universality. Contemporary metaphysics reveals that most realists about laws do not hold any sort of naive regularity theory anyway, and many already opt for something in the neighbourhood of what Cartwright suggests. Consider what is in this context an obvious contemporary realist analysis: the idea, associated with authors such as Dretske, Tooley, and Armstrong, that laws are relations between properties. Capacities are properties of things. These properties stand in certain relations to others, and do so necessarily wherever given combinations of capacities are instantiated. The possible connections between this account of laws and Cartwright's metaphysics of capacities, however, are not considered.

An absence of metaphysical detail also promotes confusion about how we are to understand capacities themselves. Capacities are generally stable, which means that things with specific capacities always 'try to behave in new arrangements as they have behaved in others' (p. 83). But this is strange, especially given that Cartwright also suggests (p. 73, and previously in *Nature's Capacities and their Measurement*, p. 9) that there is no distinction between capacities and 'occurrent' properties. This is an attractive view, but if capacities are identical to their categorical bases, it seems even clearer than it might otherwise be that things with capacities are not always "trying" to do any one thing in particular. If referring to the capacity of a substance to dissolve is really just another way of referring to (say) its molecular structure, it seems implausible to suggest that the substance is always trying to dissolve in virtue of this property, despite the stability of its capacity to do so. And in the absence of a soluble substance, we would hardly describe a solvent as "trying" to dissolve anything at all. (Cartwright would probably regard solubility as a disposition, in her terminology, as opposed to a capacity, but the distinction is questionable, and in any case immaterial to the point here.) The properties, however we refer to them, are causally efficacious in different ways, depending on the circumstances.

It would be a shame if criticisms such as those above distracted us from what lies beneath the surface. *The Dappled World* offers an inspiring picture of the nature of reality, and stimulating advice on how to interpret scientific theories. The take home message—regarding the indispensability of dispositional properties, even to an empiricist philosophy of science—calls for serious consideration and debate. Fans of Cartwright's earlier books will find some of their major themes further elucidated here. The relation of two chapters (chapter 5 on the Markov condition, and chapter 9 on the applicability of classical and quantum physics) to the central argument is somewhat obscure. But on the whole, the message is conveyed dynamically, and with a wealth of examples from physics

and economics. It may turn out that the world is dappled in one sense, and yet home to pervasive and stable laws. Relieved of the headlines, the subtle facts of the matter demand attention.

ANJAN CHAKRAVARTTY
University of Toronto

Plato's Reception of Parmenides. JOHN A. PALMER. New York : Oxford University Press, 1999. Pp. xiii, 294.

John A. Palmer's *Plato's Reception of Parmenides* is an intelligent and close study of the Plato-Parmenides connection from the standpoint of a new hermeneutic, and one which generates exciting results. Though I shall here be disagreeing with some of those results, I do so by way of hoping to engage other readers of *Plato's Reception* with Palmer's text, a text which is adroit, scholarly, and philosophical to a very high degree.

On the hermeneutic, Palmer declares it unnecessary to recover Parmenides' original authorial intentions in performing his poem ("... what Parmenides himself may have intended is largely irrelevant to an account of his influence on Plato" (9)). It is "simply a mistake--one might term it the 'essentialist fallacy'--to privilege Parmenides' intended meaning as the determining factor in his subsequent influence" (9). Here the claim is not the one (familiar to us from some contemporary French authors) that authorial intention is irrecoverable (for Palmer does claim to be doing work on Plato's intentions in the latter's 'reception' of Parmenides), but the quite different claim that it is an "error vitiating most appraisals of this influence [of Parmenides on Plato to make] the assumption that one can base an appraisal upon an interpretation of Parmenides developed independently of the actual Platonic reception" (8). And it is thus Palmer's claim that most previous studies of what I above termed 'the Plato-Parmenides connection' have tacitly assumed that we can guess at how Plato received Parmenides by starting with our own interpretations of Parmenides. Stated in this way, the hermeneutic is original and quite acceptable, indeed necessary. But if exaggerated into the intention, say, to comment only on those parts of Parmenides used by Plato utterly without any attempt to read them as they might have carried meaning for Parmenides himself, such a hermeneutic would rule out even Palmer's own procedure. For example, Palmer reads the second 'deduction' ('hypothesis') of the second half of the *Parmenides* as corresponding to what the historical Parmenides himself meant in sentences like "Both Parmenides himself and Plato's Parmenides then draw the conclusion that Being/the One is equal to itself" (242). One must therefore proceed with care, as Palmer does in the sentence I have just quoted. Palmer cannot mean that the meaning of Parmenidean words or the use or construction of Parmenidean sentences is "largely irrelevant" to a study of how Plato 'receives' Parmenides.

Second: Palmer wishes to see his own conclusions (for example, those in his interpretation of the *Parmenides*, second half) as recovering a complicated hermeneutic *within Plato himself*: the first 'deduction' argues against a Sophistic (indeed, 'Gorgianic') "deformation" (252) of Plato's criticism of Parmenides, while the second 'deduction' represents Plato's own appropriation of a