# DISPOSITIONAL EXPRESSIONS

## Routledge Companion to the Philosophy of Language

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## 1 Introduction

What is that we do when we analyze dispositions? Are we analyzing the concept of disposition? Are are we analyzing those thing, the dispositions themselves, to find their essential natures? While there has been a continuous tradition of generating and refining analyses of dispositions since the 1930s, the function and nature of such analyses have not be constant.[1] That tradition starts with Carnap's attempt to reconcile the role of dispositional terms in science with his verificationism. In the middle part of the twentieth century, interested in dispositions focussed on Gilbert Ryle's dispositional view of the mind and then later on the functionalist theory of mental states. More recently, fundamental natural properties have been held to be dispositional in nature, and the analysis of dispositions is invoked in accounting for the laws of nature. This eighty year history of the analysis of dispositions reveals changing conceptions of the function of philosophical analysis and its relationship to the philosophy of language.

## 2 Carnap on testability and disposition concepts

Rudolf Carnap's interest in dispositional expressions stems from a dilemma presented by his commitment to a certain brand of empiricism. That empiricism gives a special place to science. Science is the paradigm of what can be known and what can be said. Indeed the logical positivists sometimes suggest that science is coextensive with the extent of possible knowledge. According to A. J. Ayer (1936) 'There is no field of experience which cannot, in principle, be brought under some form of scientific law, and no type of speculative knowledge about the world which it is, in principle, beyond the power of science to give.' Given this emphasis on the primacy of science, it is important for the positivists to accommodate rather than reject the statements of science—which stands in contrast to their attitude towards the statements of metaphysics. And dispositional expressions play an important role in the statements of science. Carnap's principle example is the predicate 'soluble', but

[1] That said, concerns about the meanings of dispositional terms go back to Molière's famous satire on the appeal to dispositions in explanations. The implicit criticism is that the intuitive semantics of dispositional terms makes their use explanatorily trivial and uninformative.

many central terms in science may be considered dispositional also. 'Fitness' in evolutionary biology concerns an organism's disposition to survive and breed; 'electric charge' denotes a body's disposition to exert a force on another charged body. And so forth. Thus the commitment to science implies to a commitment to provide a satisfactory philosophical account of such predicates.

This empiricism also seemed to the positivists to provide a particular role for philosophical analysis. For the all-encompassing role of science also, it appeared to them, demands that philosophy should not be regarded as making contentful statements about the world. If philosophers claim to be so doing, then their efforts would fail and should be excluded from philosophy. Hence the rejection of metaphysics. The propositions of philosophy, says Ayer (1936: 76), 'are not factual but linguistic in character ... they express definitions, or the formal consequences of definitions.' Such a view requires a demarcation principle, to differentiate those statements that are factual (the statements of science) from those that purport to be factual but which are not (the statements of metaphysics). Furthermore, since philosophy is in the business of supplying definitions, it invites us to supply principles that constrain what counts as an acceptable definition. As is well knowns both tasks are achieved by the verification principle, which Carnap (1936: 420) expresses thus, 'the meaning of a sentence is in a certain sense identical with the way we determine its truth or falsehood; and a sentence has meaning only if such a determination is possible.' Like Ayer, Carnap (1935) emphasizes that philosophy is primarily concerned with language, 'The function of logical analysis is to analyze all knowledge, all assertions of science and of everyday life, in order to make clear the sense of each such assertion and the connections between them. One of the principal tasks of the logical analysis of a given proposition is to find out the method of verification for that proposition.'

So logical empiricism demands that the role of philosophy is to analyze the propositions of science in terms of their method of verification, and in the light of the central role they play in science, it requires that we provide such an analysis of sentences containing dispositional predicates in particular. However, if we take the method of verification to require direct observation, then a problem arises, for the satisfaction of dispositional predicates is not always directly observable. The directly perceptible properties of a soluble substance (e.g. sodium chloride) do not differ from those of an insoluble substance (e.g. barium sulphate).

While the immediate context of Carnap's article 'Testability and meaning' is the analysis of a key class of scientific predicates, logical empiricists also had a broader concern with dispositions. Phenomenalism has always been attractive to empiricists as a way of maintaining the exclusive epistemological role of experience without succumbing to scepticism. But since a simple reduction to actual experiences leads to well-known problems, unless one resorts to Berkeley's theological solution, it is natural to consider reduction to *possible* experiences, as in Mill's 'permanent possibilities of sensation' or later Mach's 'functional relations of elements' (where elements are, more or less, the same as sensations). It is natural to interpret such relations as dispositions. Mach himself intended 'function' to have its mathematical sense. But then, Schlick (1918: 212-14) complains, we would be reducing a material thing to 'something quite shadowy', and furthermore something that is a relation between things that do not exist (the possible but non-actual sensations).

So, in order to satisfy the verificationist demand that meaningful statements should be verifiable (or *confirmable* to use Carnap's preferred term, where disconfirmation is included also), the testing that will verify or confirm the presence or oth-

erwise of a disposition needs to be more than direct observation. Clearly we would expect the difference between items that are soluble in water and those that are insoluble to be observable *when the items are placed in water*. So, according to Carnap (1936), a natural first pass at a definition of '$x$ is soluble' is 'whenever $x$ is placed in water, $x$ dissolves'.

The use of 'whenever' is a mistake, for as Mellor (1974: 106) notes, this makes solubility an immutable property. It may be that in using 'whenever' Carnap was influenced by a sense of the modal nature of disposition ascriptions, to which we shall come later. Be that as it may, whether a object is soluble *now* should not depend on how it is as previous or later times, for things can gain and lose dispositions. If we ignore this error, we can express Carnap's view thus:

(D) $\quad Sx \quad \text{iff} \quad (Wx \rightarrow Dx)$

where 'S$x$' symbolizes '$x$ is soluble'; 'W$x$' is '$x$ is placed in water; 'D$x$' is '$x$ dissolves. W$x$ is the *test* condition (later *stimulus* condition) and D$x$ is the *response* condition (also *manifestation* condition).

The objection to (D) that Carnap immediately raises concerns an item that is never in its history placed in water, for example a match which is never placed in water and then is burned up. We see that the right hand side of (D) is satisfied trivially. Thus the match counts as soluble even though it clearly is not.

Carnap then considers the 'bilateral reduction sentence':

(R) $\quad Wx \rightarrow (Sx \leftrightarrow Dx).$

(R) provides a test both for the presence of and for the absence of solubility, and to that degree satisfies the requirements of the verification principle concerning meaning. On the other hand, as Carnap recognizes, (R) does not say anything about the solubility or otherwise of some item that is not in water. And so (R) does not provide any way of eliminating talk of solubility.

## 3 After Carnap

These points against (R) were also made by Thomas Storer (1951), who proposed an analysis based on the fact that soluble items that are not placed in water are in important respects like soluble items that are placed in water and do dissolve and insoluble items not placed in water are like insoluble items that are placed in water and do not dissolve. So to say that something is soluble is to say that either it is in water and dissolves or that it has some property that some other items in water have that do dissolve but is not possessed by other items in water that do not dissolve:

(S) $\quad Sx \text{ iff } (Wx \wedge Dx) \vee \exists F(Fx \wedge \exists y(Fy \wedge Wy \wedge Dy) \wedge \neg\exists y(Fy \wedge Wy \wedge \neg Dy))$

The more formal problem with Storer's proposal is that *any* item not currently in water turns out to satisfy the right hand side, so long as there is one item that is in water and is dissolving. Let **m** be Carnap's match and **c** be a sugar cube currently dissolving in water. Now let G$x$ hold precisely when ($x$=**m** $\vee$ $x$=**c**). Now we look at the second, more complex disjunct in (S), and substitute G for the variable F. We see that **m** possesses G and that there is something with G in water that is dissolving (namely the sugar cube **c**) and there is nothing with G in water that is not dissolving

(since the only other G, which is *m* itself, is not in water). So the match **m** satisfies the proposed definition of soluble.[2]

Storer had in mind '*x* is sugar' as the candidate substituend for F, rather than the gerrymandered predicate '*x*=**m** ∨ *x*=**c**'. So one might wonder whether Storer's proposal could be rescued by restricting the variable F to natural predicates. That raises the question of whether an account of naturalness can be given—we should remember that this is a period when philosophers hoped that programmes such as Carnap's could be carried out in a purely formal way. Some doubted whether any formal account naturalness could be given, and famously Goodman's new riddle of induction would later show that induction itself needs a distinction between natural and unnatural predicates while strongly suggesting that no formal account of the distinction could be given.

There are other problems. We can imagine that an object might have a disposition yet be the only thing of its kind to have that disposition. If it does not undergo the relevant test procedure (e.g. being placed in water) then (S) (or its appropriate) analogue will deny that the object has the disposition. For example, we might imagine that industrial chemists devise an entirely new material that is soluble. The basis of its solubility is a novel feature of this material, and so no other substance dissolves in virtue of possessing this property. If the chemists only ever make one sample of this material which they burn in due course, without ever placing in water, then this material will not count as soluble by (S). On the other hand, had the chemists made a second, identical sample, which they did place in water (and so which does dissolve), the first sample would count soluble by (S). In short, the objection is that whether or not an object has a disposition such as solubility cannot depend on whether other similar objects exist and are subjected to the relevant test.[3]

## 4 Introducing stronger than material conditionals

Carnap and his contemporaries sought to provide an analysis of dispositional concepts employing only second order, classical, extensional logic. The suggestion that the second order quantification should be limited to natural properties, is one proposal that would break away from this restriction. A more important proposal in the same direction concerns the nature of the appropriate conditional. Gilbert 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." In his discussion before proposing (S), 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*

[2]Wolfgang Malzkorn (2001) notes that Eino Kaila (1939) earlier made a similar proposal to Storer's, which suffers from the same problem. Malzkorn provides a very useful and detailed discussion of the history of the analysis of disposition concepts.

[3]Storer is aware of this sort of objection. His response it to appeal to some wider class of entity to which the untested entities belong, which does include tested entities. So in our case we would have to appeal to some very general class of chemical substances which includes actually dissolving instances. But it is not at all clear why there should be any wider class in all cases; the basis for this instance of disposition might be quite unlike that for any other instances. Not is it clear why, if there is a larger class, we would expect it to contain members that have undergone the test. If some members have avoided the test, all could have.

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 for empiricist concerns at the metaphysical implications of taking counterfactuals at face value. Counterfactual conditionals (and other subjunctive conditionals, which are understood to be included) have a modal component, seemingly telling us about non-actual potentialities. Ryle takes it that there can be no fact of the matter concerning non-actual potentialities. Consequently the 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.

Storer points out that (S) is equivalent to:

$$(S') \qquad Sx \text{ iff } (Wx \wedge Dx) \vee \exists F(Fx \wedge \exists y(Fy \wedge Wy \wedge Dy) \wedge \forall y(Fy \rightarrow (Wy \rightarrow Dy)))$$

whose final term tells us that everything that is F is such that if is is placed in water, it dissolves. That covers the conditional component of the counterfactual conditional, but not the modal. The modal feature is in effect what Storer is trying to capture by the idea of there being a common property between the untested object with the disposition and other objects with the disposition which are tested: this property is that which would bring about the response in the object, were it to be tested. Limiting the properties in question to natural properties is necessary for this idea to work. But it is not sufficient.

In the light of the forgoing it is not surprising that philosophers should conclude that dispositions could not be analyzed using the material conditional along with other apparatus. Rather, a stronger than material conditional needs to be employed. Let us use '$\Rightarrow$' to denote such a conditional, without saying too much about its nature: I will use subscripts to indicate potentially different notions used by different authors. Henceforth I shall use 'S$x$' to denote the test/stimulus condition, 'M$x$' to denote the response/manifestation condition, and '$D_{(S,M)}$' to denote the disposition to yield manifestation M in response to stimulus S.

Wilfrid Sellars (1958) asserts that ascription of a disposition is simply to assert a relation of implication between the stimulus and manifestation. Hence:

$$(W) \qquad D_{(S,M)}x \quad \text{iff} \quad Sx \Rightarrow_W Mx.$$

The philosophical task, according to Sellars, is to explain what 'implies' (viz. '$\Rightarrow_W$') means. Sellars himself draws on the idea of 'causal implication' (which we find also in Pap 1958), and introduced the idea found in Storer and also in Burks (1955), that we may need to appeal to the idea that when there is dispositional relationship between S$x$ and M$x$ there is a kind or property to which $x$ belongs and which plays some kind of causal or nomological role in bringing about M$x$. As Malzkorn (2001: 343) explains, the main concern of these authors was to discuss whether their notions of causal implication are compatible with a Humean regularity view of causation.

## 5 The conditional analysis of dispositions

Malzkorn (2001: 344) goes on to say that the principal obstacle to progress was that they made use of a notion of causal implication whose semantics they did not well understand. Certainly the discussion of the analysis of dispositions was given a major impetus by the development of a semantics for counterfactuals by Robert Stalnaker (1968) and David Lewis (1973), following earlier work by Saul Kripke on semantics for modal logic. The significance of these developments for the analysis of dispositions was not so much the details of the semantics for counterfactuals, but lay in a number of related considerations:

- The semantics provided for counterfactuals made them philosophically respectable. The was the case even if philosophers did not agree on the details (Stalnaker and Lewis themselves differed slightly) or had doubts about how the possible worlds semantics should itself be understood.
- Lewis explained how the semantics of counterfactuals itself depends on laws, and then provides a Humean account of laws. This enabled a separation of the issue of the semantics of counterfactuals from the analysis of laws.
- The latter also showed how a Humean approach could indeed be consistent with an account of dispositions that employed a stronger than material conditional. At the same time, concern about the empiricist credentials of any analysis was waning as a result of the retreat of empiricism in the philosophy of science, and the resurgence of interest in metaphysics, especially modal metaphysics, thanks to the work of Kripke and others.
- Lewis also provided an account of causation in terms of counterfactuals, allowing a further dissociation of counterfactuals, laws, and causes. Thus it was possible to see that the causal conditional of Burks, Pap, and Sellars is a conflation of two related but separate notions, the counterfactual conditional and causation.

In the light of the above, we can replace the '$\Rightarrow$' in (W) with a pure counterfactual conditional; '$\Box\!\!\rightarrow$'. Thus (W) becomes:

(W′) $\quad D_{(S,M)}x \quad \text{iff} \quad Sx \Box\!\!\rightarrow Mx.$

These analyses satisfy the description of dispositions and their definitions given by Storer in the quotation provided above than does his own analysis. (W′) is what is now known as the (simple) conditional analysis of dispositions, (CA), and is the basis of much of the recent discussion of dispositions.

To summarize: by the 1960s, it was widely accepted that dispositional statements either mean the same as or at least entail counterfactual or subjunctive conditionals. David Armstrong (1969: 23) tells us, as if it were not much more than a platitude, that, 'If we consider the attribution of (say) brittleness to a particular piece of glass then one outstanding feature of the attribution is that it licenses certain *conditionals*. If the glass remains unbroken, then conditionals will be 'counter-factual'. If the glass had been struck, it would have broken.' However, until Stalnaker and Lewis, counterfactuals were themselves sufficiently mysterious and even suspect that authors felt obliged not to rest content with analyzing dispositions in terms of counterfactuals but were required to bypass the counterfactuals and to give an account in yet further terms that reflect wider philosophical (typically metaphysical)

concerns. After Lewis, it was possible to distinguish acceptance of the (subjunctive/counterfactual) conditional account of the meaning of disposition statements from discussion of the metaphysics of dispositions. Thus the following (identical to (W′) above) was generally accepted:

(CA) $\quad D_{(S,M)}x \quad \text{iff} \quad Sx \mathrel{\Box\!\!\rightarrow} Mx.$

while debates focussed on, for example, whether some feature of the world is required to make statements $D_{(S,M)}\mathbf{a}$ and $S\mathbf{a} \mathrel{\Box\!\!\rightarrow} M\mathbf{a}$ true (as denied by Ryle's phenomenalism and asserted by Armstrong's materialism). (CA) is the conditional (or simple conditional) analysis of dispositions. That name is slightly misleading in that all the analysis so far considered involve conditionals (see Carnap's (D) for example). What is distinctive about (CA) is that the conditional is a subjunctive or counterfactual one, as well as the fact that that is all there is to the analysis.

# 6 Objections to the conditional analysis

The conditional analysis, however, suffers from now well-known flaws. The key to Martin's (1994) objection is the following consideration. As before, we are interested in the case where there is an object with a disposition, but it is not receiving its stimulus and is not showing its manifestation. (CA) asks us to consider what would happen were it to receive its stimulus, telling is that it would show its manifestation. The supposition of the stimulus occurring takes us away from actuality, and may take us to possibilities that differ from actuality in respects relevant to the production of the manifestation. The features of the actual world that make it true that the object has the disposition may be absent in the nearest stimulus world, or not retained long enough for the manifestation to occur. The same point applies to the non-existence of the disposition and the non-occurrence of the manifestation: the disposition is absent in the actual world, but the features of the world which make this so may differ in the nearest stimulus world sufficiently for them to bring about the manifestation.

A classic *finkish* disposition exploits the fact that in a normal case of stimulating a disposition in order to bring about its manifestation, that process takes time. The object may be stimulated at time $t$ but the manifestation occurs only at $t+\delta$. Dispositions come and go. Very hot glass is not fragile. So a fragile glass might lose its fragility by being heated. Let us imagine that were the stimulus to occur at $t$ that would cause the disposition to disappear very quickly, certainly well before $t+\delta$. As a consequence, the process that would normally lead to the manifestation is interrupted, and the manifestation does not occur. So, for example, striking a fragile glass causes it to be heated very rapidly, sufficiently rapidly that the process of breaking is halted, and the glass does not break. Such an example might instantiate a common kind of trope in the literature, introduced by David Lewis, a spell-casting sorcerer. In Lewis's example of finkishness, a sorcerer protects a fragile glass by casting a spell that would remove its fragility were it to be struck.

Other objections focus on the fact that even if the disposition remains in place, its presence plus the stimulus may not be causally sufficient to bring about the manifestation. For environmental conditions may need to be appropriate, and the causal process may need to take place in a particular way. If such conditions are interfered with, the manifestation may not occur. Such interferers are *masks* (Johnston 1992) or *antidotes* (Bird 1998).

# 7 Further developments in the analysis of dispositions

The 1990s and 2000s saw increased interest in the analysis of dispositions coming from a number of quarters. In the philosophy of language, Kripke (1982) considered and rejected dispositional accounts of rule-following, meaning, and understanding. But Martin and Heil (1998) argued that such a rejection depends on accepting (CA). The falsity of (CA) means that a counterfactual account of X and a dispositional account of X will differ in certain cases. Consequently problems with a counterfactual account of, for example, intentional or free action (Frankfurt 1969) may be overcome by preferring an account in terms of dispositions or related states, such as capacities (Smith 1997). In both cases, the objections can be seen to be trading on finks or masks/antidotes.

David Lewis (1997) proposed a reformation of (CA) to deal with the case of finks. For if the causal basis of the disposition were retained for long enough, the manifestation would come about. Lewis's reformed conditional analysis is based on this idea. It doesn't address the problem of masking. And it has a problem with identifying the causal basis of a disposition. It would be circular to say that something if fragile iff were that thing struck and it to retain the causal basis of its fragility for long enough, it would break. So Lewis quantifies over all intrinsic properties of the object: *x* is disposed to break when struck iff there is some intrinsic property B such that were *x* struck and to retain B for long enough, then the striking plus B would together be a cause of *x*'s breaking. But note that things that are fragile lose their fragility when struck. So if something were to retain its causal basis for fragility for too long, then it would not break. Consequently we must also ascribe to a fragile object the disposition when struck, to remain unbroken and vibrate. Lewis's account multiplies dispositions beyond plausibility.

Recall that our initial concern was with dispositional terms as they appear in science, terms such as 'soluble'. We should distinguish, as Lewis does, between terms such as 'soluble', 'fragile' etc. and expressions such as 'disposed to dissolved when immersed in water', 'disposed to break when struck. The latter are overtly dispositional whereas the former are covertly dispositional, or 'conventional' and 'canonical' dispositions as Choi puts it. One source of potential confusion with the analysis of disposition expressions is that it is often assumed that a covert (canonical) dispositional expression is equivalent to some straightforward overt dispositional expression. Note that (CA) is expressed in terms of overt dispositional expression. Above we found that (CA) seems to be refuted because something may be fragile yet it is false that it would break if stressed. But such a counterexample works only on the assumption just discussed, that the covertly dispositional '*x* is fragile' is equivalent to the overtly dispositional '*x* is disposed to break when stressed'. However, if that assumption is mistaken then the existence of finks and antidotes cannot be taken immediately to refute (CA). It might instead refute the simplistic equation of covert and overt dispositional expressions. Indeed Choi undertakes a defence of (CA) on precisely this basis.

A problem arises when we combine (CA) with the standard Stalnaker–Lewis semantics for counterfactuals. that semantics include the centering condition: A∧B entails A$\Box\!\!\rightarrow$B. Thus any two facts are related by the subjunctive conditional '$\Box\!\!\rightarrow$'. (CA) says that any two possible or actual states that are subjunctively related are dispositionally related. Combining these tells us that any two facts are dispositionally related. Since that is clearly false, either (CA) needs amendment or the Stalnaker–Lewis semantics does. Since there are independent reasons for wanting to adjust the

latter, it might be worth considering whether further adjustments to the semantics for '$\Box\!\!\rightarrow$'. For example, we may give up not only centering but also weak centering: A$\Box\!\!\rightarrow$B entails A$\rightarrow$B. If we do this, then it is no longer clear that finks and antidotes suffice to refute (CA). For then a case where the stimulus S occurs but the manifestation M does not occur is consistent with S$\Box\!\!\rightarrow$M. That might be justified if what replaces weak centering is the condition that only in *normal* worlds where S$\Box\!\!\rightarrow$M is true, is S$\rightarrow$M also true (cf. Gundersen 2002, 2004).

While such moves permit us to strengthen the tie between dispositions and subjunctive/counterfactual conditions, other developments propose movement in the opposite direction, for example the proposal that dispositions should be align with habitual or generic propositions.

# 8 Metaphysical considerations again

Carnap's original analysis was motivated by metaphysical (or, rather, anti-metaphysical) considerations. Dispositional expressions are familiar parts of scientific vocabulary, and so require accommodation rather than elimination. That analysis must be in terms of the observationally verifiable features of things. This leads directly to the first problem we come across in the analysis of disposition expressions, the fact that they do not refer to directly observable features of things. They therefore need analysis in terms of such features to be made respectable, as their place in science demands.

The view the without suitable analysis dispositions were to be deemed not entirely respectable remained even after the verificationist impetus to Carnap's project had waned. The conditional analysis, (CA), allows for an account of what dispositional *properties* (such as solubility) are. The truth of a dispositional *predication* is given by (CA). But what makes the conditional itself true? That question requires a response if we reject Ryle's inference ticket view. A common answer is that the subjunctive/counterfactual conditional is made true by the existence of some *categorical* property plus the laws of nature. Thus:

> $D_{(S,M)}x$ is made true by, for some categorical property F, $Fx \wedge$ it is a law of nature that $\forall x(Fx \wedge Sx \rightarrow Mx)$

A categorical property is held to be one that has none of the troubling dispositional character that requires analysis. As Mellor (1974: 157) puts it: 'Dispositions are as shameful in many eyes as pregnant spinsters used to be—ideally to be explained away, or entitled by a shotgun wedding to take the name of some decently real categorical property.'

In the light of the above, the following remarks are sometimes made:

(I) The dispositional–categorical distinction is primarily a conceptual linguistic distinction, not a metaphysical one. The dispositional–categorical distinction is not a distinction between categories of properties, but between classes of expression, between those that permit a conditional analysis and those that do not. (Strawson 2008; cf. Mumford 1998: 65)

(II) Dispositional expressions ('$D_{(S,M)}$' in the above) are ones that characterize properties (such as F in the above) via their typical effects in the actual world with its actual laws of nature (Quine 1973; Mackie 1973; Armstrong 1997). Or

they refer to higher-order functional properties (e.g. the property of possessing some categorical property such as F in the above) (Prior et al. 1982; Prior 1985). In the context of the philosophy of mind, where mental states may be seen as dispositions, the former yields an identity theory, whereas the latter yields the functionalist view.

(III) Correspondingly, the failure of (CA) thanks to finks and masks/antidotes is sometimes held to be metaphysically significant. That failure vindicates the metaphysical programme of rehabilitating dispositional properties real properties as distinct from being either just as the shadows of conditionals or identical to categorical properties or higher order functional properties realized by categorical properties (cf.Wright 1990, Martin 1994: 7; Mumford 1998: 63; Schrenk 2010: 171).

Such debates reflect some unclarity about the nature of attempts to analyze dispositions and the relationship between the semantics and metaphysics of dispositions. As the idea that philosophical analysis is a matter of investigating our concepts comes under question (Williamson 2007), it might appear that the alternative in this case will hold that the philosophical activity of analyzing dispositions concerns those properties, the dispositions, rather than our concept of disposition. But to take such a view requires that there is indeed a distinct class of things the dispositional properties. That is what (I) above denies. (I) itself is plausible to the extent that it is plausible that (CA) or something like it is true. Conversely, if it is true that we cannot find a straightforward analysis of dispositions, it become more plausible that our dispositional expressions do pick out a distinct class of properties, properties that are dispositional in nature. The position has a rough analogue in the analysis of knowledge. If the simple justified true belief account of knowledge were correct, then that would indicate that 'knowledge' is a term that serves simply to pick our a subclass of beliefs, those that meet certain additional conditions. In which case it is plausible that the analysis of knowledge is just a matter of analysis a concept. On the other hand, as Williamson (1995) argues, the failure of attempt to analyze knowledge into belief plus other conditions is evidence that states of knowing are not a subclass of the states of belief, but constitute a distinct kind of mental state. In which case the analysis of knowledge (conceived more broadly than simply supplying necessary and sufficient conditions) is an investigation into the nature of knowledge itself.

On the other hand there is uncertainty as to whether the dispositional and disposition-like expressions themselves form a unified class. The distinction between covert and overt dispositional expressions has already been mentioned; it is not agreed that we can assimilate these to a single class. Moreover, terms for abilities, capacities, tendencies, and propensities have similarities to disposition terms, but no clear unification of all these is yet available. Putting that variety on one side, there are questions about what sort of thing such terms could refer to. The expression 'dispositional property' carries with it a degree of ambiguity. Some terms in basic physics refer to properties that are argued to be dispositional in nature or *essentially* dispositional, for example 'inertial mass', 'charge' and so forth (Ellis and Lierse 1994; Bird 2007). Such properties are fundamental natural properties and so are good candidates for being sparse universals. On the other hand the paradigm disposition expressions discussed in the literature, such as 'fragility' denote properties that are neither fundamental nor obviously natural. If it is appropriate to think of these are referring to entities at all, the referents will be abundant universals. If 'T' refers to a sparse universal, it is plausible to think that the analyzing T is analyz-

ing the thing, the universal T, and that this is a different exercise from analyzing the concept *T* (or the term 'T'). On the other hand, if 'T' denotes an abundant universal, then it is rather less clear that there is distinction between analyzing T and analyzing the concept *T*. For the existence of abundant universals seems to be little more than an ontological shadow of the possibility of predication by the concept *T*—if, that is, there are abundant universals at all (cf. MacBride1998). So if properties that are paradigmatic dispositions such as fragility, solubility, malleability, etc. are not natural properties, then it is difficult to see how there can be a project of analyzing dispositions that is different from analayzing the concept *disposition*.

# 9 Conclusion

The earliest phase of the history of analyses of dispositions conceives itself as engaged in the task of analyzing dispositional expressions or concepts, but is motivated by radically empiricist (anti-)metaphysics and epistemology which gives rise to the verificationist criterion of meaningfulness. Carnap's own failed attempts show that it is impossible to provide a complete analysis of dispositional expressions that complies with that criterion. The same empiricism limits Carnap to use of truth-functional connectives, so his 'conditional' analysis of dispositions invokes only the material conditional, which is too weak for the purposes required of it (those purposes including: characterising what is true of a soluble item that is never placed in water and distinguishing it from a non-soluble item never placed in water). Some authors noted that a soluble item-never-placed-in-water will often be similar to a soluble item that is placed in water (and so dissolves). This approach is of interest because for the first time it introduces the idea of what we would now call the *causal basis* of the disposition, and because it raises questions concerning the naturalness of properties. Metaphysical questions of a kind inimical to radical empiricism are beginning to come to the fore. The true break with Carnap's intended programme comes when it is understood that the material conditional needs to replaced by something stronger and so non-truth-functional. This eventually settles on the counterfactual/subjunctive conditional, giving the standard (simple) conditional analysis of dispositions. It settles on this slowly partly because of residual empiricist scepticism about such conditionals but also because such conditionals were poorly understood—a state of affairs remedied by the possible-world semantics of Stalnaker and Lewis in the late 1960s and early 1970s.

The conditional analysis, backed up by a semantics for the conditional, is only the beginning of the contemporary story of the analysis of dispositions. This debate is pursued not, as it was by Carnap, to avoid substantive metaphysics but in order to aid it, first in order better to understand the commitments of a dispositional–functional account of mind and then thanks to dispositional essentialist accounts of natural properties and laws. Nonetheless, the business of analyzing dispositions is still seen primarily as one concerning the nature of disposition expressions and concepts. But as such an approach is questioned by the recent debate regarding the nature of philosophical analysis itself. Interestingly, the metaphysics and semantics of dispositions being entwined as they are, it may be that the plausibility of the differing views of the nature of philosophical analysis, as found in the philosophy of dispositions, will itself depend on the outcome of the actual process of analysis itself—a process that is by no means complete.

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