

Dispositions Revisited

Abstract

Subjunctive conditionals have their uses, but constituting the meaning of dispositional predicates is not one of them. More germane is the analysis of dispositions in terms of “bases”—except that past efforts to maintain an ontic gap between dispositions and their bases, while not wholly misguided, have failed to appreciate the semantic birthright of dispositional concepts as a species of theoretical construct in primitive science.

At this late date, startlingly new revelations about dispositional concepts are not to be expected. Even so, important details of these still need clarification. I shall here argue (1) that the one agreement where contemporary disposition theorists are in virtual unanimity is a consensus in the wrong; (2) that the relationship between dispositional and nondispositional attributes is more intimate than all but the most extreme views on this have been willing to countenance; and (3) that this intimacy cannot adequately be characterized within the confines of classic semantical theory.

I

Wherever disposition-theoretic disputations may lead, the accented point of departure is that dispositional predications are analytically equivalent to non-extensional if/then assertions. Thus (Bergmann, 1958, p. 60) “There is no argument in philosophy proper about the adequacy of the definitions of dispositions by if-then statements. Whatever argument there is . . . is about whether a certain formalization of these definitions is adequate.” And more recently (Alston, 1971, p. 127): “Let us say that a given predicate . . . is ‘purely dispositional’ if and only if a statement attributing that predicate to someone is synonymous with a subjunctive conditional, or a conjunction thereof, where the antecedent of each conditional specifies some state of affairs and the consequent specifies a reaction of the subject to attribution to that situation.” That

(1) ‘ x is ϕ able [ϕ ile, ϕ ful, ϕ ous, ϕ ive, etc.]’ means ‘if x is ψ d, then x ϕ s’,

or more precisely, that

(1a) ‘ x is ϕ able at time t ’ means ‘If x were ψ d at time t , then x would ϕ at time $t + \Delta t$ ’,

where ψ is a certain treatment which can be applied to x and ϕ is some type of

event in which x may participate, is just not controversial today.¹ This consensus is, however, decidedly premature.

As a preliminary, note the difficulty of actually translating everyday dispositional predicates, e.g. ‘soluble’, ‘porous’, ‘fragile’, ‘explosive’, ‘sticky’, ‘courageous’, ‘agile’, ‘fearsome’, ‘contemptible’, ‘ravenous’, ‘gullible’, ‘inventive’, ‘thrifty’, etc., into their alleged if/then equivalents. What are the specific ψ ings and ϕ ings germane to these? Relevant outcome events are often not hard to verbalize. Thus solubility, fragility, explosiveness, fearsomeness, ravenousness, gullibility, and inventiveness evidently envision acts of dissolving, breaking, exploding, frightening, eating, gulling, and inventing, respectively. But how shall we describe the outcomes which porosity,² stickiness, courage, agility, and thriftiness potentiate? (With some effort I can do rough justice to the first two, but the last three are quite beyond me unless we identify outcome in terms of disposition, like saying that courage disposes courageous actions.) And for which of these examples can we actually say what ψ , simple or complex, is necessary and sufficient for something which ϕ s when ψ d to count as ϕ able? (Solubility is probably the one for which we can do best, yet letting ψ be *is-immersed-in-liquid* is far from adequate—the type, quantity, and temperature of immersing liquid,³ details of the interface between liquid and tested object,⁴ etc., are also additionally relevant albeit virtually impossible to itemize exhaustively. Our inability to give common-sense disposition terms *precise* analysantia is not the problem here, for if ‘ x is ϕ able’ really were equivalent in meaning to ‘If x is ψ d then x ϕ s’, then ‘is ψ d’ and ‘ ϕ s’ should together contain as much vagueness as does our concept of ϕ ability. Nor do I dispute that we can often describe the specific test-antecedents and test-outcomes which lead us to infer dispositions on particular occasions. What I *do* contend is that seldom if ever are the dispositional assertions employed in science and everyday life synonymous with if/then statements which we can actually produce, even ignoring the further complication that a realistic if/then would need to be weaker than an invariant-consequence relation. (I.e., x can be ϕ able even though for no ψ is it certain that x would ϕ if

¹The event of “ x ’s ϕ ing” is intended to subsume changes not only in x itself but also in other entities to which x becomes appropriately related by the ϕ ing (e.g. effects of x on measuring instruments). The phrasing of (I) is not entirely suited to the latter case, but that should not impair my discussion’s applicability to it.

²I am construing porosity as a disposition similar to permeability; yet one could also argue that it is a gappy structural state which accounts for a certain interaction with imposed fluids. The ambiguity of interpretation in this and other cases turns out, under my position in Part III, to be in fact no ambiguity at all.

³By “type” I mean not merely water vs. alcohol vs. liquid helium, etc., but also the test liquid’s saturation with other solutes (cf. the precipitation, rather than dissolution, of salt crystals in supersaturated brine).

⁴Total immersion is of course unnecessary (cf. the pitting of a soluble’s surface by drops of solvent). On the other hand, even total inversion does not guarantee the required contact between object and solvent (e.g. when the object has been waxed). But what is this “required contact” anyway? (May not some objects be commonsensically soluble precisely because their reaction to the solvent lays down a coating which blocks further dissolution?)

ψ d.) In saying this it is not at all my intent to deny that dispositional concepts have analytic ties to certain test-condition/test-outcome notions. But I strongly question whether ordinary language provides clear support—if, indeed, any support at all—for what has become the orthodox view of this connection.

My chief objection to formula (1), however, concerns the if/then connective itself. It has by no means gone unnoticed that traces of obscurity still invest the meaning of ‘If p then q ’. Even so, there is general agreement that so long as this locution is construed to carry subjunctive/counterfactual force, i.e. to be read as ‘Were p , then would q ’ as distinct from the extensional ‘ $p \supset q$ ’ which clearly will not do here, then (1) can be defended regardless of what this strong conditionality may itself prove to be. But does an if/then connective of the needed sort in fact exist?

It would, of course, be silly to deny that the words ‘If ____ then ...’ often occur in serious discourse with a force not adequately captured by ‘If ____ \supset ...’. But that does not suffice to establish the much stronger thesis that the linguistic function of this nonextensional if/then is to make declarative assertions. For some words do not play a declarative role, not even syncategorematically. Extreme instances in point are ‘?’ and ‘!’ in written discourse, and the verb in ‘You shall ...’; but closer to the case at hand are connectives like ‘however’, ‘nonetheless’, ‘but’, ‘whereas’, ‘although’, ‘moreover’, ‘accordingly’, and especially ‘therefore’. To replace natural occurrences of these by their nearest extensional equivalent (essentially the conjunctive ‘and’) would devastate the cohesion of a passage which they help structure even while leaving its descriptive content unaltered. Without attempting precise definition of the notion, let me call such terms “dialectical” in recognition that their function is not to construct statements *but to parse arguments*.⁵ I now submit that the primary role of the subjunctive/counterfactual if/then is likewise dialectical; specifically, that ‘Were p , then would q ’ is not an assertion but a conditional argument. According to my own linguistic intuition, saying ‘If p then q ’ with subjunctive force differs from ‘ p , therefore q ’ only in reserving judgment on p . (I.e., just as ‘Were p , then would q ’ converts to ‘Had p , then would have q ’ when enriched by denial of p , so does assertion of p strengthen it into ‘ p , therefore q ’.) An important practical feature of such arguments, moreover, is that ‘Were p then would q ’, like ‘ p , therefore q ’, is usually an enthymeme whose miss-

⁵The logic of such “dialectical” terms is tricky; I have never encountered even the rudiments of a systematic theory thereof and cannot seriously try to redress the deficiency here. They are clearly related to what I have elsewhere (1972a, p. 38, Note 5) called the “mode” (e.g. propositional attitude) of a cognition as distinct from its content, but the extent to which they (a) signal a mode of entertainment for the contents to which they are conjoined, or (b) transform those contents into an asserted justification for that mode (cf. Rozeboom (1972a, p. 52)), is unclear. For example, when a speaker argues ‘ p , therefore q ’, is he expressing merely that the credence he gives to q derives from his confidence in p , or is he better construed as asserting ‘ p is the case, and p , in light of ... necessitates q !’? The latter schema can probably seldom be given cash value in real cases; yet the fact that I can disagree with your ‘ p , therefore q ’ without questioning your sincerity suggests that the “mere signal” interpretation is not enough.

ing premises need to be supplied by context and whose implication is often weaker than strict entailment.⁶

That subjunctive/counterfactual conditionals are generally defensible only relative to a context of unverbalized premises has been observed well and often enough by others (e.g. Chisholm (1946), Rescher (1961), Nagel (1961, p. 63ff)) that the point needs no further support here except perhaps to note that while the proper interpretation of an if/then contention is by no means always unambiguous, some, like 'if he had been well rested, he still would have lost the race', will not begin to tolerate any reading other than as enthymematic argument.

Now, synonymy claim (1) or (1a) is clearly unacceptable if its if/then is dialectical. For in the first place, 'x is ϕ able' is prima facie an object-language assertion, whereas insofar as a conditional argument can be construed as an assertion at all it is a meta-linguistic claim about entailment or, perhaps, credibility relations. More importantly, if 'x is ϕ able' is true of some but not all arguments x, then the right-hand side of (1) can only be an ellipsis wherein a suppressed predicate ' θ ', whose conjunction with ' ψ ' entails ' ϕ ', is asserted to hold for x. (If the right-hand side of (1) claimed that ' ϕx ' follows merely from ' ψx ', it would then either be true for all x or false for all.) There may or may not be a case to be made for

(2) 'x is ϕ able' means ' θx , and ' $\theta x \cdot \psi x$ ' entails ' ϕx '

for some predicate ' θ ', but if (2) does adequately analyze the disposition, then (1) evidently does not. Note, moreover, that the only empirical information on the right-hand side of (2) is ' θx ', so that (2) is virtually equivalent to

(2a) x is ' ϕ able' means 'x has θ '.

Hence were (1) defensible as an ellipsis for something like (2), it is an ellipsis which is singularly unenlightening as an analysis of ϕ ability.

The inadequacy of (1) under dialectical if/then does not of course foreclose its tenability under some other interpretation of the conditional. But if so, what might the latter be? It is brute philosophic history that no proffered descriptive/logical explanation of conditionality except material implication and logical entailment has ever

⁶That the subjunctive/counterfactual conditional is an argument, rather than an assertion, has already been proposed by, *inter alia*, Mackie (1962) and Walters (1961). However, to point out a possibility does not suffice to establish its truth. My present case for this interpretation is twofold: (1) There exists a large class of what I here call "dialectical" terms, whose job is argumentation rather than assertion; hence such treatment of the subjunctive conditional proposes not a linguistic anomaly but assimilation to a category which must be acknowledged in any event. (2) Dialectical usage of if/then cannot adequately be reconstructed as assertions about entailment, because we often argue 'If _____, then ...' not only when we cannot supply the elided premises, but also when the inference is neither strictly deductive nor patterned by any other inference form whose epistemic merits are clear.

shown the slightest viability.⁷ And if, as seems eminently plausible, all natural occurrences of if/then are at least *amenable* to the dialectical interpretation,⁸ we may well question whether our present linguistic repertoire contains any other sense of conditionality. At the very least, then, (1) is a highly dubious premise on which to ground analysis of dispositional concepts. If there is some sense in which (1) is true, this still very much remains to be identified

To be sure, even if the two sides of (1) are not synonymous, they may still analytically relate in some other fashion. Indeed, the dialectical reading of ‘If ψx , then ϕx ’ points naturally to one such prospect. For an important use of incomplete expressions is to call attention to what can be taken from context to complete them; and proffering an enthymematic argument, in particular, is one way to allege the argument’s suppressed premises. (That such elliptic assertions are generally cryptic, ambiguous, or otherwise obscure does not detract from their practical convenience. Many ordinary-language locutions are useful precisely *because* they gloss over the holes in our knowledge of what we are talking about.) Thus if it is inherent in the meaning of ‘ ϕ ability’ that ‘ x is ϕ able and x is ψd ’ implies ‘ $x \phi s$ ’, the enthymematic argument, ‘If x were ψd , then x would ϕ ’, could serve as a practical near-paraphrase for asserting that x is ϕ able without requiring that the former be an appropriate *analysis* of the latter. Since “implies” is an open relationship which, moreover, comes commonsensically in assorted grades weaker than strict entailment (e.g. probabilistic and inductive implication), ‘ x is ϕ able’ might in this way sustain and in turn be near-paraphrased by an indefinitely large family of conditional inferences of form ‘If x is $\psi_i d$, then x likely $\phi_j s$ ’ without any logical construction out of a finite set of the ψ_i and ϕ_j being analytically equivalent to ‘ x is ϕ able’—just as true of real-life dispositional concepts.

II

Suppose that it is in some sense correct to say of a particular object x that if x (at time t) were ψd then x (at time $t + \delta t$) would ϕ , even though this is not true of all objects. In what might this correctness reside? At the very least, its failure to obtain universally requires there to be something distinctive about x which, were we to know of it and how it matters, would allow us to infer, under the supplementary hypothesis that x is ψd , that $x \phi s$. Moreover, the fine grammar of subjunctive/counterfactual conditionals relevant specifically to dispositions places a further important constraint on the inference’s suppressed premise. For as witnessed by the contrast between

If John’s Chemistry grade is D , then he must have failed English

⁷Including my own efforts in this regard—see Rozeboom (1968, p. 148f), retracted in Rozeboom (1971)

⁸And perhaps occasionally as material implication, as in ‘If she’s under 40, then I’m a two-headed giraffe!’. Even such rhetorical uses of the conditional can be construed as enthymematic argument, however, in this case *reductio ad absurdum*.

[since we know that his English grade was lower than his Chemistry grade],

Had that rock been silver, it could not have come from Peter's collection
[since none of Peter's rocks as large as that one have any commercial value],

and

If you ask John about his English grade, he'll probably retort that it's none
of your business,

Had that rock been dropped, it would have shattered,

some conditionals, unlike others, intimate that their antecedents would *produce* their consequences. I am not sure that this productivity allegation is tokened by syntax alone; but it is clearly an ingredient in any conditional fitting the schema 'If x is ψ d then x ϕ s', which envisions x 's ϕ ing as an occurrence brought about by a process beginning with imposition of the ψ -condition upon x . Thus if it is correct to argue, given that x is ψ able, that x would ϕ if ψ d, it must be that x has some property (or configuration of properties) which enables the event of x 's being ψ d (at t) to make happen a ϕ ing by x (at $t + \Delta t$). Just how that property relates to the predicate '____ is ϕ able' is what this essay hopes to clarify.

It has of course been well recognized in the recent literature that dispositions generally have "bases" which are responsible for objects' having the dispositions they do. Treatment of this point has, however, been less-than-edifyingly glib. What is it, anyway, for a property θ of x to be a "base" for x 's being disposed to ϕ if ψ d? By traditional intuition, this is true if and only if the conjunction of θ and ψ "lawfully" yields /, the classic first approximation to analysis of which in turn is

$$(3) \quad (x)(\psi x \cdot \theta x \supset \phi x).$$

A notorious inadequacy in (3) as it stands is that it might be true "accidentally" rather than nomically, e.g., if nothing is ever ψ d when it has θ , or if the one, two, or few things which are ψ d when they have θ just happen to ϕ then for reasons unrelated to θ and ψ . A related but deeper objection to (3) is that it should be possible for a thing to be ψ d and coincidentally to ϕ without its ψ ing being at all instrumental in its ϕ ing. Yet if satisfying (3) or some extensional strengthening thereof sufficed for θ to enable ψ to bring about ϕ , then, inasmuch as (3) becomes logically true when θ is replaced by the disjunction of ϕ and not- ψ , it would follow that any x which happens to ϕ (at time t) also has a property (at t) which enables x 's ψ ing to make it ϕ . So (3) is far too weak to express the "lawfulness" required of a disposition's base. At the same time, while the strict universality of (3) may be a convenient simplifying ideal,

we must not make this an essential feature of our explication of nomic regularity on pain of presupposing a deterministic universe.

These objections to (3) can largely be met by turning instead to scientifically more realistic regularity statements of form

$$(4) \quad \Pr(\phi \mid \psi \cdot \theta) \geq r,$$

in which \Pr is the statistical probability of one property relative to another. (A more common philosophical expedient, namely, to replace \supset in (3) with an arrow or verbal if/then and then simply declare that the connective has nomic or subjunctive force, is barefaced hand waving.) Since statistical probabilities are logically independent of the corresponding relative frequencies, there is no problem of (4)'s being "accidentally" true; and r can be whatever value less than unity is appropriate to the indeterministic reality of the case. But (4), too, is inadequate. A relatively minor complication is that the joint efficacy of ψ and θ for producing ϕ is shown not by comparison of $\Pr(\phi \mid \psi \cdot \theta)$ to some fixed numerical standard, but to the probabilities of ϕ given $\sim \psi \cdot \theta$, $\psi \cdot \sim \theta$, and $\sim \psi \cdot \sim \theta$ respectively. (Thus no matter how large $\Pr(\phi \mid \psi \cdot \theta)$ may be, ψ is nonetheless irrelevant to ϕ given θ if $\Pr(\phi \mid \psi \cdot \theta) = \Pr(\phi \mid \sim \psi \cdot \theta)$.) More serious is that not even the patterning of statistical probabilities suffices to identify the lines of nomic determination, nor to discriminate statistical dependencies which are purely nomic from those which are all or in part logical. Thus if $\Pr(\phi \mid \psi \cdot \theta) > \Pr(\phi \mid \sim \psi \cdot \theta)$, it will also be the case that $\Pr(\psi \mid \phi \cdot \theta) > \Pr(\psi \mid \sim \phi \cdot \theta)$ —which inequalities hence fail to clarify whether, given θ , it is ψ which brings about ϕ , ϕ which brings about ψ , or whether ψ and ϕ are joint products of a common source.⁹ And unless $\Pr(\phi \mid \sim \psi) = 1$, we can always find a θ such that $\Pr(\phi \mid \psi \cdot \theta) = 1 > \Pr(\sim \psi \cdot \theta)$ by letting θ be the disjunction of ϕ and not- ψ . So far as we now have good reason to suspect, patterns of statistical dependency derive (at least in part) from the structure of nomic dependencies, but are not *definitive* of the latter.

I do not wish to probe the nature of nomic dependency on this occasion for the matter is unpleasantly complicated, not just in unsolved problems but even establishing an appropriate conceptual framework within which to address these.¹⁰ It quite suffices for present purposes to postulate the existence of a "base" relation B over attribute triples such that a proper explication of 'An object's possession of θ (at time t) enables its being ψ d (at t) to bring about its ϕ ing (at time $t + \Delta t$)' asserts that

⁹Under the intuitively gripping but never rationally established premise that is unidirectional in time, consideration of temporal ordering reduces these alternatives but still does not uniquely specify causal structure in a multivariate probability distribution without the assistance of other questionable assumptions.

¹⁰I have touched upon certain aspects of this matter elsewhere (Rozeboom, 1968, 1971; see especially p. 350f. of the latter for some intimations of the grammatical issues). However, neither I nor to my knowledge anyone else has laid out in print the syntactical foundations required of a scientifically adequate theory of causality.

(5) $B(\theta, \psi, \phi)$.

(If (5) is equivalent to the conjunction of θ and ψ standing in a diadic causal-production relation to ϕ , as seems rather likely though the point is irrelevant here, (5) is symmetric in its first two arguments.) My wording of this postulate strives for compatibility with my main point in this section, namely, that *our understanding of nomic (causal) determination is still profoundly obscure* even though some such concept which is not reducible even to statistical probability much less Humean regularity appears essential to the practical conduct of human affairs. It is entirely possible that there exist a number of such B -relations, any one of which is as much the referent of our present vague notion thereof as is any other; and only time will tell which are the more fruitful targets of explication. Meanwhile, presuppositions about what can or cannot be the “base” of something’s being disposed to ϕ when ψ d offer a singularly infirm foundation on which to rest an analysis of dispositions.

III

What are dispositions? I have already argued—briefly, but surely there can be no serious disagreement about this—that if ‘ ϕ ability’ is conceptually grounded on the ϕ ngs of certain things when they are ψ d, then the statement

(6) x is ϕ able

analytically entails

(7) $(\exists\beta)[\beta x \cdot B(\beta, \psi, \phi)]$,

in which formalized predicate ‘ $B(\ , \ , \)$ ’ refers as best we can to the *enables-to-bring-about* relation. (7) may be taken to assert that x has a base of ϕ ing if ψ d. However, nothing should thereby be prejudged about the nature of that “base” beyond its B -relation to ψ and ϕ . There is no requirement—unless somehow implicit in our conception of *enabling-to-bring-about*—that this base-property be “actual” in contrast to mere potentiality,¹¹ or that its possession by x is an enduring state rather than transient occurrence, or that it is some microstructural feature, or that we can refer to it in categorical terms alone or in a way logically independent of ψ and ϕ . When someone as astute as Alston (1971, p. 1, fn. 12) allows the possibility of baseless dispositions, this can only rest upon a conception of “base” more restrictive than

¹¹I do not want to suggest for a moment that I accept actuality vs. potentiality as a valid distinction *in re*. I quite agree with Alston (1971) that actual/potential (categorical/dispositional) is at best a difference in how we conceive of certain properties rather than in what is so conceived. But if there *were* to exist properties whose quality of being is less than full-blooded categorality, they would lie within the scope of the quantifier in (7).

intended here. For does not ϕ ability itself enable ψ ing to bring about ϕ in things which are ϕ able? Since (7) is a logical consequence of (6) and

(8) $B(\phi\text{ability}, \psi, \phi)$,

analyticity of (8) suffices for (6) to necessitate (7).

But is (8) in fact true, analytically or otherwise? Were ' $B(\theta, \psi, \phi)$ ' equivalent to some variant of (3) or (4), proof of (8) would be simple. However, I have taken pains to insist that nomic determination is not just extensional or statistical regularity, and the predictability of ϕx given that x is both ϕ able and ψ d leaves open whether ϕ ability has any causal influence on ϕ . Indeed, there are powerful arguments both for and against (8). This conflict, and its resolution, is the main event for which my remarks to now have been preliminaries.

To decipher the logic of dispositional terms, it is necessary to appreciate the semantic character and epistemic origins of real-life theoretical concepts. It is by now generally agreed—as much as philosophers ever agree—that our conceptions of the explanatory sources of empirical events are constituted by what we theorize about the interrelations and data connections of these underlying entities. Moreover, the idealized examples of theoretical constructs favored by the philosophic literature should not be thought to imply that theories which introduce such terms need be axiomatically articulate or intellectually complex triumphs of advanced science. Long before the self-consciously inventive theoretician acquires any appreciable body of phenomena to interpret in his own prestigious way, the really raw experiences natural to everyday life or contrived by the brutally empirical phase of a technical discipline have become organized by low-level, modest-scope theories dictated with inductive immediacy by the observations they help to explain. Moreover, the most powerfully elemental of all data patterns which sustain such explanatory inductions is precisely the context in which dispositional concepts arise. I have elsewhere discussed this form of ontological discovery in some detail (1961, 1972b)). Briefly, it is that when we observe that two or more variables covary within a restricted but intuitively “natural” class of entities in a fashion not universally true of these variables, we inevitably conclude—often with a degree of conviction approaching certainty and with little awareness of making an inference at all—that there is a property common to each member of this class which is both responsible for and identifiable in terms of this covariation. For example, if among the fragments of a shattered meteorite you were to find some pieces which emit a soft glow when and only when you touch them with your bare hand, you might be astonished to discover that some rocks have a property—call it “tactiluminosity”—which causes them to glow when touched, but you would not likely question that your tactiluminous rocks have this property at each moment of the period through which you examined them even though what you have actually observed is only a one-one coordination between touch and glow within

a sample of the class of their time-slices.

My first major contention, then, is that if ‘is ϕ fable’ is a dispositional predicate whose meaning is constituted by ‘is ψ d’ and ‘ ϕ ’, the real-life usage of this concept is most accurately reproduced by idealizing it as a theoretical term “implicitly” defined by a theory of form

$$(9) \quad B(\phi \text{ ability}, \psi, \phi) \cdot \phi \text{ able}\{x_1, \dots, x_m\} \cdot \text{non-}\phi \text{ able}\{y_1, \dots, y_n\},$$

where ‘ $P\{ \}$ ’ asserts that each entity cited within the braces has property P . Once the concept of ϕ ability has *originated* in this way, it can and, if it has any practical value, does soon become caught up into an increasingly elaborate experience-based theory which links ϕ ability to various other observational, dispositional, and higher-level theoretical properties that increasingly illuminate what ϕ ability is while thereby so enriching our concept of this property that we no longer think of it primarily as dispositional.¹² The extremist interpretation of dispositions as not merely requiring bases but themselves *being* these bases, which only Armstrong (1969) has had the audacity to avow unreservedly,¹³ does no more than simple justice to our treatment of dispositions in science and everyday affairs.

However, *de facto* language practices need not be impeccably correct practices. Even if the ϕ ability concept is, in fact, defined by theory (9), it remains to judge whether that theory is tenable in all respects, and if not, how it should best be revised. There are, indeed, two important reasons why one might well balk at my account of dispositions so far, no matter how true to natural language it may be. For one, if x is ϕ able, may not x have not just one but many properties which severally enable x ’s being ψ d to make it ϕ ? In particular, should not any property of x which logically or nomically entails that x is ϕ able count as a base of this disposition and hence qualify, under the present view, as the identity of x ’s ϕ ability? (E.g., if it is a natural law that all sugar dissolves when put into water, isn’t the base of a particular lump’s solubility *inter alia* simply its sugarness?)¹⁴ And secondly, may not two different objects have the same disposition on entirely different bases? (E.g., cannot salt and sugar both be soluble without their respective molecular structures which account for this being at all alike?)

¹²The countless cliché repetitions of Molière’s scoff at explaining the soporific effects of opium by appeal to its “dormative power” reveal an insufficient grasp of the logic of scientific inference. The *virtus dormitiva* of opium is why people who take it, unlike most other substances, become drowsy. Of course, by itself that leaves a great deal still unknown about this power’s nature, but learning of its existence and how to diagnose its presence/absence in particular cases is a necessary preliminary to pursuit of that knowledge. Apart from a questionable (see below) distinguishing of powers from dispositions, Harré (1970, pp. 89ff.) has the right of this matter.

¹³In his insightful disentangling of semantic from ontological issues in this context, (Alston, 1971) allows that dispositions may in particular cases be identical with their bases; but, with a prudence that seems excessive in light of his own arguments, also envisions that in some cases they may not.

¹⁴Cf. Squires (1970, p. 16) in objection to Armstrong.

Before confronting these two objections head-on, consider first a generic implication of seeking to analyze dispositions in terms of bases which, when followed to its seemingly irresistible conclusion, makes these objections irrelevant. If x does have a property which enables x 's being ψ d to bring about its ϕ ing, then surely any plausible treatment of dispositions must hold x to be ϕ able. Consequently, if (6) necessitates (7), we have that

(10) ' x is ϕ able' is analytically equivalent to ' $(\exists\beta)[\beta x \cdot B(\beta, \psi, \phi)]$ '.

But if (10) is true—and not to be coy about it let me say that I think it is essentially true—then do not the two predicates respectively ascribed to x by the right and left sides of (10) have the same meaning? If so, it follows that

(11) ϕ ability \equiv_{def} the property of having a property which enables being ψ d to bring about ϕ ing,

or more formally,

(11a) $_$ is ϕ able $= (\exists\beta)[\beta _ x \cdot B(\beta, \psi, \phi)]$.

Let the right-hand side of (11a) be abbreviated as ' $EB_{\psi\phi}(_)$ '. Since having a property which satisfies a condition K is generally not itself such a property (see below), x has $EB_{\psi\phi}$ by virtue of having one or more bases of ϕ ability, yet $EB_{\psi\phi}$ remains distinct from these. Neither are two different objects which both have $EB_{\psi\phi}$ required to share any base of ϕ ability.

Despite the seductive appeal of proposal (11)—accepted in one variant or another by *inter alia* Burks (1955), Sellars (1958), and Harré (1970)—there are two and a half good reasons why it is a conclusion to be shunned if at all possible. The half reason, which will seem cogent only to the ontologically finicky, is that if logically complex predicates do not always designate properties (cf. Rozeboom, 1962, p. 27ff.), there may not be any such property as $EB_{\psi\phi}$ even when there are properties which satisfy ' $B(_, \psi, \phi)$ '.¹⁵ To be sure, that would not prevent ' $_$ is ϕ able' from synonymy with ' $EB_{\psi\phi}$ ', and in any event it is not clear just what is risked by a Platonistic ontology whose permissiveness stops short of paradox. Nonetheless, $EB_{\psi\phi}$'s ontic status still warrants a modest concern.

Even if $EB_{\psi\phi}$ poses no existence problem, however, it cannot plausibly be held responsible for enabling ψ to bring about ϕ . (Any exceptions to the general principle,

¹⁵My treatment, above, of $B(_, _, _)$ as a triadic relation on properties presupposes that a complex predicate can usually be construed to designate a corresponding property. However, if my present qualm is taken seriously, this account needs replacement by a vastly more complicated one which, indeed, I am not altogether sure how to give.

that the property of having a property of kind K is not itself of kind K , are at best logically anomalous.¹⁶ And it is especially counterintuitive that the property of having a part-cause of ϕ might itself be a part-cause of ϕ .) But if it is false that $B(EB_{\psi\phi}, \psi, \phi)$, then, inasmuch as ϕ ability is normally held to be why certain things ϕ when ψ d, acceptance of (11) requires abandoning a major feature of natural disposition-talk. To be sure, it may simply be an error for ordinary language to speak so. Even if untrue of *de facto* usage, perhaps (11) is how, for philosophic purity, we *ought* to construe dispositions. However, it is one thing to assume revisionist responsibility for the language of your average fumble-tongued man on the street and a rather different one to arbitrate the growth of theoretical concepts in technical science. To argue for (11) with its implied rejection of (8) is either to demand that we find some term other than ‘ ϕ ability’ to designate the source of a thing’s ϕ ing when ψ d—which would profit nothing, since pending further theoretical advances (see below) the new term’s usage would be indistinguishable from our present use of ‘ ϕ ability’—or to deny that explanatory concepts can be effectively created by theoretic definitions of the sort envisioned for ‘ ϕ ability’ in (9).

Finally, while proposal (11) obviates the problem that two objects may both ϕ when ψ d without a common enabler of this, it does so at the price of scientific emasculation. When we infer from e.g. the correlation between touch and glow in a sample of a certain meteorite fragment’s time-slices that this rock is tactiluminous, our inference is not just that it has *some* property at each sampled time t which enables its being touched then to make it glow, but that the *same* underlying property is responsible for this throughout the observation period. (The induction schema which generates the first stage of explanation for such data contains no provision for variation in the inferred source-property.) Moreover, if the time courses of certain other rocks at this site also show this same touch/glow correlation, the evidence is presumptive that the source of this correlation is common to all. (Same symptoms, then, lacking counterindications, probably same cause.) Further evidence may well induce us to withdraw this initial hypothesis in favor of a more sophisticated interpretation, the complications of which I shall consider shortly. But in the early stages of ψ - ϕ theory, we need a construct by which to surmise that different objects have the *same* source of ϕ ing when ψ d. If the ‘ ϕ ability’ concept were not employed for this purpose, we would have to coin another term to do the job.

So (11) is not a happy solution to the nature of dispositions. But how, in the teeth of (10), can it be avoided? If we cling timidly to orthodox semantical theory, it probably cannot be. But it so happens that in a series of articles which have met with underwhelming response (Rozeboom (1960, 1962, 1964, 1970), I have argued that theo-

¹⁶For example, if EK is the property of having a property of kind K , symmetry urges that any relation which EK bears to one property of kind K it should also bear to any other. Yet if EK is itself of kind K , symmetry fails for the Identity relation unless EK is the only property of kind K —which latter prospect points to even greater peculiarities which need not be explored here.

retical concepts have a semantic character under which a statement ‘ $S(\tau)$ ’ containing theoretical term(s) ‘ τ ’ can be analytically equivalent to a statement ‘ S^* ’ not containing ‘ τ ’—i.e. ‘ $S(\tau)$ ’ and ‘ S^* ’ may necessarily have the same truth value—even though they respectively signify different states of affairs. Stripping the matter to essentials, if ‘ τ ’ derives its meaning entirely from theory ‘ $T(\tau)$ ’, then ‘ τ ’ designates entity e if and only if e satisfies ‘ $T(\)$ ’ while ‘ $T(\tau)$ ’ is true if and only if ‘ τ ’ succeeds at reference, i.e. iff it is the case that $(\exists x)T(x)$. Yet whereas ‘ $(\exists x)T(x)$ ’ claims only that a satisfier of ‘ $T(\)$ ’ exists, ‘ $T(\tau)$ ’ if true predicates ‘ $T(\)$ ’ of an entity which is responsible for the truth of the existence claim. To be sure, one troublesome complication accompanies this analysis of theoretical concepts: If ‘ $T(\)$ ’ is true of several entities, then theory ‘ $T(\tau)$ ’ cannot without further enrichment single out just one of these as the referent of ‘ τ ’ to the exclusion of the others; hence the classic semantical assumption that reference (designation, aboutness) is a many-*one* relation must be revised to admit of terms which have multiple referents. Although this liberalization is a formidable one for technical semantics to assimilate, it is an inescapable condition on the possibility of knowledge about entities which lie outside of our direct experience (whatever the latter might specifically mean). For if e_1 , and e_2 , though numerically distinct, are alike in all respects which affect us, then there is simply no way short of magic for us to form a concept of e_1 which does not equally apply to e_2 . Whatever we know only in terms of a set of its properties, relational or otherwise, is perforce not distinguished by us from whatever else may also possess those particular properties. It may well occur that the identification built into such a concept suffices to characterize a unique referent, but this can only be a happy empirical accident, not a semantic necessity.

In light of theoretical reference’s generic nonuniqueness, the first objection to identifying dispositions with their bases turns out to be no problem at all. If more than one property satisfies the predicate ascribed to ‘ ϕ ability’ in (9), then the ϕ ability concept simultaneously designates each one of them. It is worth noting, though, that properties which so qualify may be rather less abundant than first thought might expect. For until we know more about the B -relation, we should not presume that if property θ enables ψ to bring about ϕ , this also holds for any property θ' which nomically or logically entails θ . In particular, if the B -relation requires its instantiations to be uncontaminated by nomlc irrelevancies, it will generally not be true that when θ satisfies ‘ $B(\ , \psi, \phi)$ ’, the conjunction of θ with another property also does so. Thus even if all sugar is by law soluble, sugarness *per se* need not count as a base for this disposition.

Our second problem, that different objects may be ϕ able without having the same source of ϕ ing when ψ d, remains troublesome however. Suppose that properties θ_1 , and θ_2 both enable ψ to bring about ϕ , that object x_1 , has θ_1 , but not θ_2 , that object θ_2 has θ_2 but not θ_1 , and that neither x_1 nor x_2 have any other properties which dispose ϕ ing. Then to claim that x_1 and x_2 are both ϕ able implies under (8) that $(\exists\beta)[\beta x_1 \cdot \beta x_2 \cdot B(\beta, \psi, \phi)]$ contrary to assumption. I fear that *de facto* disposition talk encounters a predicament here from which it can be extricated only by some

delicate maneuvering.

To understand the precise nature of this predicament, it is necessary to view ‘ ϕ ability’ from the perspective of scientific constructs which *evolve*. And to make clear that dispositions are nothing special in this regard, I will engage the issue at a level of abstraction which subsumes dispositions as an undistinguished instance.

Suppose that early data on objects $x_1, \dots, x_m, y_1, \dots, y_n$ strongly suggest that

$$(12) \quad T(\tau) \cdot \tau\{x_1, \dots, x_m\} \cdot \text{not-}\tau\{y_1, \dots, y_n\},$$

in which ‘ τ ’ is a theoretical term there introduced for the first time, so that (12) is analytically equivalent to, though not semantically identical with,

$$(12a) \quad (\exists \alpha)[T(\alpha) \cdot \alpha\{x_1, \dots, x_m\} \cdot \text{not-}\alpha\{y_1, \dots, y_n\}].$$

Theory (12) envisions not only that there are properties of kind T —i.e. ones which satisfy the second-level predicate ‘ $T()$ ’—but also that a property of kind T is common to objects x_1, \dots, x_m . Now, this latter assumption can almost always be weakened without loss of import for the theory-initiating data. Thus, only object-interactions of a rather special sort could distinguish (12) from

$$(13) \quad T(\tau_1) \cdot T(\tau_2) \cdot \tau_1\{x_1, \dots, x_h\} \cdot \tau_2\{x_{h+1}, \dots, x_m\} \\ \cdot \text{neither-}\tau_1\text{-nor-}\tau_2\{y_1, \dots, y_n\},$$

$$(14) \quad T(\tau_1) \cdot T(\tau_2) \cdot \text{either-}\tau_1\text{-or-}\tau_2\{x_1, \dots, x_m\} \\ \cdot \text{neither-}\tau_1\text{-nor-}\tau_2\{y_1, \dots, y_n\},$$

or from similar replacements of the single property τ by a larger k -tuple τ_1, \dots, τ_k of postulated kind- T properties. Nevertheless, though (13), (14), and their respective k -fold extensions are logically safer hypotheses than (12),¹⁷ we would never seriously contemplate proliferating τ -concepts in this fashion so long as (12) suffices to account for our data. *Why* we would not seriously consider this is perhaps an involved story, but an important part of it are matters of intellectual economy which go beyond bare considerations of credibility, the same economy manifest in our adoption of idealizations and approximations when unrelenting exactitude would vastly complicate our

¹⁷Note that (13) and (14) do not include stipulation that $\tau_1 \neq \tau_2$, so that (12a) entails the corresponding existential quantifications of (13) and (14). The weaker theories hypothesize that there exists either one or two kind- T properties variously possessed by x_1, \dots, x_m ; (13) goes beyond (14) in specifying subsets of the x_i which are held to be alike in their kind- T properties even if there is more than one of these.

thinking while increasing its potential accuracy at most trivially. In the case of theory (12), even if we suspect that the primordial τ -concept may eventually require partition among a set $\{\tau_i\}$ of kind- T properties, there would be little point to introducing distinctive names for these before we have any notion of how many are needed or when, as in (14), we make no differential application of them. Even more foolish would be a theory like (13), which does sort data objects into distinct τ_i -classes, if nothing in the extant data indicates which specific objects are more T -wise alike than are others. When objects x_1, \dots, x_m , unlike y_1, \dots, y_n , all show evidence of having a property of kind T while there is reason to think that some of the x_i are alike in this regard and no clues to which, if any, may differ therein, the only sensible theoretic “model” (idealization, first approximation) is (12). So long as each of the x_i and none of the y_j have a kind- T property, (12) errs at most in imputing somewhat less diversity to the sources of observational similarity among x_1, \dots, x_m than may in fact be true. In the event of our discovering how to distinguish empirically among a plurality of kind- T properties, it will be easy enough to adjust theory (12) appropriately.

(But what can we say about the semantics of theoretical predicate ‘ τ ’ defined by (12) if in fact x_1, \dots, x_m divide into several groups sharing different kind- T properties? Well, what should we say about the semantics of any real-life linguistic expression—term or proposition, theoretical or observational—blemished by inaccuracy, vagueness, and other epistemic imperfections which by classical standards should bar it from truth or reference? If philosophical semantics now lacks means to acknowledge that assertions which only approximate literal truth are still true approximately, and that could vague terms not designate at least vaguely no language-in-use would ever be about anything, so much the worse for semantical theory’s present adequacy to formalize cognitive reality. When the needed semantical concepts of graded truth and reference become available, we should be able to say both that theory (12) has a certain degree of truth even when x_1, \dots, x_m differ somewhat in their kind- T properties, and that the predicate ‘ τ ’ defined by (12) designates each kind- T property ‘ τ_i ’ exemplified by some of the x_i even if the quality of that reference deteriorates with decreased communality of τ_i among its alleged exemplars.)

With passage of time and research effort, the theory of τ is sure to undergo modification, if only because the original τ -paradigmatic objects are soon forgotten and require replacement by new instances. (Any theory whose concepts depend in part on reference to dated events needs continual re-creation just to remain the same.) More importantly, with burgeoning information about property-kind T —information likely extracted in part from empirical regularities involving the τ -criteria established by proto-theory (12)—conceptual resources afforded by more advanced theories will permit construction of many distinct predicates ‘ μ_1 ’, ‘ μ_2 ’, . . . , each of which purports to describe a diagnosable property known or suspected to be of kind T . As theory (12) thus passes into obsolescence, what happens to usage of the original predicate ‘ τ ’? I am not sure what a statistically detailed historio-graphic study of this question would

reveal, but three main alternatives stand out on rational grounds.

One is for the τ -notion simply to be abandoned, save for traces which inevitably cling to the lay tongue and enrich its covert mythology. This is especially likely if the original criteria for τ -predication are far below the levels of observational precision now demanded by technical research in this area.

Secondly, ‘ τ ’ or some variant thereof may be retained to divide objects which have kind- T properties from those which do not, but emasculated of any imputation that different objects to which ‘ τ ’ applies are necessarily alike in respects distinguished by modern μ -predicates. This amounts to redefining ‘ τ ’ as

$$(15) \quad \tau _ _ =_{\text{def}} (\exists \alpha)[T(\alpha) \cdot \alpha _ _],$$

which allows ‘ τ ’ to retain many of its original implications even though no longer aspiring to designate a property of kind T .

Thirdly, if the original τ -criteria still seem usefully diagnostic of properties which interest the theory to which the μ -predicates belong, or if the letter’s relation to the former is still under study, the usage of ‘ τ ’ may pass over into what might be described as “contextually minitheoretic.” By this I envision ascription of ‘ τ ’ to one or more objects x_i with the predicate’s meaning constituted by a theory of form (12) but in which the postulated co-exemplars of τ are only a local comparison set which generally changes from one context to another without implying trans-contextual invariance of theoretic reference. Thus if in this sense I assert on one occasion that object z_1 (like z_2, \dots, z_m) has τ , and on another that w_1 (like w_2, \dots, w_m) has τ , I imply that z_1 has a kind- T property also common to z_2, \dots, z_m and that w_1 shares one with w_2, \dots, w_m , but not that any such property is common to both the z_i and the w_j . Under this usage, ‘ τ ’ still designates one or more properties of kind T , but its specific referents vary with context, namely, to whatever properties of kind T are common throughout the comparison set for a particular ascription. In limiting cases where the comparison set comprises only one object x , assertion ‘ τx ’ is analytically equivalent to ‘ x has a property of kind T ’, but differs from its semantics under usage (15) in attributing to x whatever kind- T properties x may have.

To revert specifically to dispositional predicates, I now suggest that while my earlier account in terms of (12) best reconstructs the sense of ‘ ϕ ability’ in its first blush of youth, changes occur of the sort just described as we differentiate our conceptions of what might enable ψ to bring about ϕ . If the term does not fade into disuse, it may regress to the sense of ‘ $\text{EB}_{\psi\phi}$ ’ (see p. 11). Or it may shift to contextually minitheoretic status, which differs from its initial usage only in acquiring an implicit scope restriction—i.e., to be ϕ able, x now needs to share a ψ -to-make- ϕ enabler only with a context-specified subset of things which are said to be ϕ able, not with all of them. The latter usage, with its retention of semantic potency even while its former

idealistic universality has become adaptive to local circumstances, may be considered the *mature* phase of a dispositional concept's evolution. In contrast, the 'EB _{$\psi\phi$} ' sense of ' ϕ ability', which has lost reference to the sources of ϕ ing, is its *geriatric* stage.

The youthful, mature, and geriatric versions of dispositional predication are sufficiently alike from the standpoint of practical language that one would not expect to find them clearly distinguishable there nor much everyday awareness that these distinctions even exist. The trichotomy can best be construed as a model for decreasing the disparity between commonsense disposition-talk and our philosophic reconstructions thereof. I have already pointed out why the geriatric interpretation is not generally a happy one—it damns as fallacy our custom of holding x 's ϕ ability *responsible* for x 's ϕ ing when ψ d, and fails to provide a vehicle for our belief that objects in the same explanatory-induction class have the same source of their reactions to ψ . And I need not re-review the youthful interpretation's untenably idealistic implication that all ϕ able objects are so for the same reason. By interpreting dispositions maturely, however, we retain ϕ ability as a source of ϕ ing even while allowing the scope of implication that ϕ able things have the same source of this to be only so broad as seems locally reasonable, most appropriately the induction class within which an observed $\phi - \psi$ covariation reveals the ϕ ability of its members. Clearly, this last reading maximizes the philosophic respectability of most *de facto* dispositional ascriptions and should hence be our preferred reconstruction so long as philosophical semantics can stomach it. To close, therefore, let me point out that ordinary language makes heavy-duty use of a class of expressions which are entirely respectable grammatically, yet which function in exactly this way. These are the semi-demonstratives—'those guys', 'yesterday's news', 'his awful jokes', etc.—which unite a context cue and category name to designate one or more instances of that category. My proposal, then, is that ' x is ϕ able' says deftly, if not wholly unambiguously, what could otherwise be clumsily put as ' x has the-enablers-of- ψ -to-make- ϕ -which-these-things-do'.

References

- Alston, W. P. (1971). Dispositions and occurrences. *Canadian Journal of Philosophy*, 1, 125–154.
- Armstrong, D. M. (1969). Dispositions are causes. *Analysis*, 30, 23–26.
- Bergmann, G. (1958). *Philosophy of Science*. Madison, WI: University of Wisconsin Press.
- Burks, A. (1955). Dispositional statements. *Philosophy of Science*, 22, 175–193.
- Chisholm, R. M. (1946). The contrary-to-fact conditional. *Mind*, 55, 289–307.
- Harré. (1970). Powers. *British Journal for the Philosophy of Science*, 21, 81–101.
- Mackie, J. L. (1962). Counterfactuals and causal laws. In R. J. Butler (Ed.), *Modern learning theory*. London: Blackwell.

- Nagel, E. (1961). *The structure of science*. New York: New York: Harcourt, Brace & World.
- Rescher, N. (1961). Belief-contravening suppositions. *Philosophical Review*, 70, 176–196.
- Rozeboom, W. W. (1960). Studies in the empiricist theory of scientific meaning. *Philosophy of Science*, 27, 359–373.
- Rozeboom, W. W. (1961). Ontological induction and the logical typology of scientific variables. *Philosophy of Science*, 28, 337–377.
- Rozeboom, W. W. (1962). The factual content of theoretical concepts. In H. Feigl & G. Maxwell (Eds.), *Minnesota studies in the philosophy of science* (Vol. 3). Minneapolis: University of Minnesota Press.
- Rozeboom, W. W. (1964). Of selection operators and semanticists. *Philosophy of Science*, 31, 282–285.
- Rozeboom, W. W. (1968). New dimensions of confirmation theory. *Philosophy of Science*, 35, 134–155.
- Rozeboom, W. W. (1970). The art of metascience, or, What should a psychological theory be? In J. R. Royce (Ed.), *Toward unification in psychology*. Toronto: Toronto University Press.
- Rozeboom, W. W. (1971). New dimensions of confirmation theory II: The structure of uncertainty. In R. Buck & R. S. Cohen (Eds.), *Boston studies in the philosophy of science vol viii*. Dordrecht, Holland: D. Reidel Publishing Co.
- Rozeboom, W. W. (1972a). Problems in the psycho-philosophy of knowledge. In J. R. Royce & W. W. Rozeboom (Eds.), *The psychology of knowing*. New York: Gordon & Breach.
- Rozeboom, W. W. (1972b). Scientific inference: The myth and the reality. In R. S. Brown & D. J. Brenner (Eds.), *Science, psychology, and communication: Essays honoring William Stephenson*. New York: Teachers College Press.
- Sellars, W. (1958). Counterfactuals, dispositions, and the causal modalities. In H. Feigl, M. Scriven, & G. Maxwell (Eds.), *Minnesota studies in the philosophy of science, Vol. 2*. Minneapolis: University of Minnesota Press.
- Squires, R. (1970). Are dispositions lost causes? *Analysis*, 31, 15–18.
- Walters, R. S. (1961). The problem of counterfactuals. *Australasian Journal of Philosophy*, 39, 30–46.