

# A Priori Reasons: A Fresh Look at Disposition Predicates

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## 1. Introduction

As indicated by the title, this paper can be seen from two perspectives.<sup>1</sup> Good old solubility being my main example, it can be understood as another discussion of disposition predicates, which have been causing so much trouble since the times of logical positivism. More precisely, it can be understood as an attempt to analyse the meaning of disposition predicates in the setting of the new orthodoxy in the philosophy of language which has been initiated by Donnellan's (1966) theory of definite description, Kripke's (1972) theory of proper names, and others, which in my view was perfected by Kaplan's (1977) theory of characters and supplemented by Stalnaker's (1978) variant theory of propositional concepts.<sup>2</sup> This orthodoxy seems to throw new light onto disposition predicates; since it is not so new any more I am surprised that I could not find such an attempt being explicitly carried through.

Mainly, however, this paper is a study of apriority. This notion has received at least two markedly distinct meanings in the history of philosophy. On the one hand, it denotes necessary, unrevisable features of doxastic states, i.e. properties which all doxastic states of doxastic subjects have. Beliefs in analytic sentences, in Kant's synthetic sentences a priori or in sentences like "I am here now" count as paradigms of this kind of apriority; their truth is considered to be a priori and unrevisable. On the other hand, the notion signifies features of a doxastic state which it has prior to any information about the part of reality considered by it and which may well change through such information.<sup>3</sup> The most prominent example is provided by a priori

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<sup>1</sup> I am indebted to Ulrike Haas-Spohn and Wolfgang Benkewitz; pondering their ideas and publications gave the main impetus for this article. Furthermore, I would like to thank Hans Rott, Jay Rosenberg and my former colleagues of Bielefeld for the valuable discussions I had with them.

<sup>2</sup> The precise sense in which Stalnaker's theory is an important variant of Kaplan's is explicated in Haas-Spohn (1995), sect. 1.4, 2.1, and 3.9.

<sup>3</sup> The phrase "prior to any information" may seem sufficiently clear, but is beset with notorious difficulties like the one that the subject must be equipped with concepts for structuring the relevant part

probabilities which one seeks to characterize by a principle of insufficient reason or by various symmetry or indifference postulates, Carnap's inductive logic being the most forceful attempt; of course, such a priori probabilities may change through experience or information. I shall continue to label both notions with the word "a priori"; however, no confusion will arise from this.

The two notions of apriority have had a hard time in this century: the first because apriority was merged with analyticity by the influential logical empiricists and could thus not gain an independent role (in my perception this has radically changed only through Kripke 1972); and the second because the discussion on a priori probabilities made apparent, rather than solved, the difficulties involved (as I shall indicate, it was only default logic which made an important contribution to this field). Here I shall try to improve the score of these notions by providing new clear instances of them and clarifying the relations between them; these new instances arise in connection with disposition predicates – whence the two facets of this paper.

So, the plan is: Section 2 introduces some epistemological preliminaries. In section 3, I try to succinctly rehearse Kripke's notion of apriority within the Kaplanian setting, something which does not seem to be completely common ground. Section 4 rehearses the discussion on disposition predicates and reduction sentences. The upshot is section 5 joining the topics of the previous sections and providing, among other things, a new characterization of normal conditions. Section 6 is an annex on the metaphysics of dispositions. Finally, section 7 briefly indicates, as an outlook, that the approach to dispositions developed here may have deep epistemological consequences.

## *2. Beliefs and Reasons*

I have just talked of a priori features of doxastic states. This may have been slightly mystifying and needs to be cleared up first: Commonly one speaks of a priori beliefs (or sentences or statements expressing these beliefs). However, it is a feature or a property of a doxastic state that a certain belief is held in it; and if the belief is a priori, so is this feature. Now there surely are many other features of doxastic states. If, e.g., a doxastic state assigns subjective probability  $1/6$  to a certain event, then this is not what is

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of reality in its prior doxastic state, concepts which it cannot have acquired without rich wordly experience. Quine (1969), p. 86, turns this difficulty into one of his arguments against the analytic/synthetic distinction. However, I hold this phrase to be useful despite such difficulties, as the examples to be given will show.

usually called a belief; but it is a property of this state, which may or may not be a priori.

Indeed, it is useful to divide the features of doxastic states into static and dynamic features (each science does it with its objects): the examples just mentioned, and many more, belong to the statics of a doxastic state which deals with how the state is at a given time. The dynamics of doxastic states, however, is concerned with the way and the rules according to which these states change. These changes have many causes; besides inevitable forgetfulness the most important surely is that one gathers experience and thereby updates one's doxastic state.

Now it should be clear that here, as usually in philosophical contexts, doxastic states are considered not as a purely empirical phenomenon, but also in the normative perspective of rationality theory which tells how doxastic states should reasonably be and change.<sup>4</sup> This makes intelligible why reasons also belong to the dynamic features of doxastic states: Rationally we form those beliefs for which we get sufficient reasons, keep those for which the cluster of reasons and counter-reasons does not relevantly change, and give up those to which sufficient counter-reasons emerge. It is of utmost importance here not to conceive reasons narrowly as deductive reasons. In fact, for almost all our empirical beliefs we only have non-deductive or, as I shall say, inductive reasons; this way of talking refers only to their non-deductivity and is not meant to imply any specific so-called inductive method.

More precisely, I take the relation of one belief (content) or proposition to be a reason for another to be constituted by positive relevance: Talking of reasons makes sense only if beliefs can be conditionalized and come in degrees of firmness<sup>5</sup> – be they modelled as probabilities, as OCF-values as introduced in Spohn (1988) (or ranks, i.e. values of ranking functions, as I prefer to say today<sup>6</sup>), or in some other way. Then one can formulate the perfectly natural explication that a proposition *A* is a reason for a proposition *B* in a given doxastic state if and only if *A* is positively relevant for *B*, i.e., if *B* is more firmly believed conditional on *A* than conditional on non-*A*.<sup>7</sup> And *A* is a reason for *B* given *C* if and only if *A* is positively relevant for *B* given *C*, i.e., if *B* is more firmly believed conditional on *C*-and-*A* than conditional on *C*-and-non-*A*. Of course, precise sense is given to this explication only relative to a precise model of

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<sup>4</sup> In Spohn (1993) I tried to explain the peculiar normative-empirical double life of rationality theory.

<sup>5</sup> The former indeed presupposes the latter, if my considerations in Spohn (1988) are correct.

<sup>6</sup> Because Goldszmidt, Pearl (1992) have coined the term "ranking functions" for the OCFs.

<sup>7</sup> The reason relation thus explicated belongs to the dynamics of doxastic states because the conditional degrees of firmness to which the explication alludes are essential for describing the dynamics.

doxastic states; however, we shall get along here without introducing such a model in formal detail.<sup>8</sup>

In the sequel, apriority will be considered with respect not only to static, but also to dynamic features of doxastic states, not only in form of a priori beliefs, but also in form of a priori reasons – where apriority is taken in both senses. I have given examples for a priori beliefs (more will come). A priori reasons may at first be exemplified by deductive reasons as given in analytically valid deductions. Later we shall see, however, that a priori reasons are not confined to analytic reasonings, but extend to inductive, non-analytic reasonings – a highly important fact apparently insufficiently recognized by the philosophical community.

### *3. Kant, Kripke, Kaplan and Beliefs a priori*

Let us take a careful look now at beliefs which are a priori in the sense of being unrevisable. In my view, these beliefs should be analysed in the framework of Kaplan (1977), which in turn can best be understood by recognizing how Kripke (1972), and with him major parts of analytic philosophy, did not catch up with, but nevertheless outstripped Kant. This sounds paradoxical, but it is not.

Surely, Kant's introduction and application of his two central dichotomies, the analytic/synthetic distinction and the a priori/a posteriori distinction, was of fundamental philosophical importance. Because of the non-existence of analytic judgments a posteriori these distinctions were not logically independent; nevertheless, and this is their point, they were not identical, either, due to the existence of synthetic judgments a priori. Equally surely, trying to come to terms with Kant's views filled subsequent generations of philosophers with despair.

In contrast to the concept of analyticity which is a key concept of the philosophy of language and therefore took center stage during the linguistic turn in analytic philosophy, the concept of apriority was marginalized, mainly, it seems, because the logical positivists did not know what to do with it and simply identified it with the concept of analyticity.

Some philosophers, analytic or not, may have recognized this defect early on, but it was generally realized only through Kripke's (1972) reinstitution of the a priori as an

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<sup>8</sup> Still, it would be useful with respect to the later parts of my paper to have such a model in mind: either probability theory or the theory of ranking functions of Spohn (1988) both of which allow a perfect account of positive relevance.

independent concept. Kripke did not catch up with Kant because his examples of synthetic sentences a priori to be mentioned in a moment are more or less banal. It is still not clear how Kant's principle of causality, for instance, one of his cardinal synthetic principles a priori, can be tackled in Kripkean terms.<sup>9</sup>

Nevertheless, Kripke also outstripped Kant. His resurrection of the a priori was but a by-product of his efforts which mainly concerned the reinstatement of the ontological dimension; the real focus of his lectures was the concept of ontological or metaphysical necessity. Something is ontologically or metaphysically necessary, if it could not be otherwise. For example, there is no way how it could be false that

(1)  $2 + 2 = 4$ , or

(2) bachelors are unmarried.

Inasmuch as

(3) water consists (mainly) of H<sub>2</sub>O,

it could not be otherwise; nothing not consisting of H<sub>2</sub>O could be water. Inasmuch as

(4) Hesperus is identical to Phosphorus,

it could not be otherwise; whatever we counterfactually assume about Hesperus we counterfactually assume about Phosphorus; therefore their non-identity could not hold even counterfactually. Inasmuch as

(5) you, dear reader, are human,

it could not be otherwise; you are necessarily human; if something is not human it could not be identical with you. However, the fact that you are presently reading this article is not necessarily, but only contingently true; you could find an easier pastime.

On the other hand, a truth is epistemically necessary or a priori according to Kripke if it could not turn out to be otherwise than we assume it to be, i.e., if it is unrevisably

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<sup>9</sup> My own suggestion can be found in Spohn (1991), sect. 4, where I deduce some versions of the principle of causality from certain coherence principles which should turn out to be a priori if interpreted in Kaplan's (1977) framework.

and in this sense necessarily believed to be true.  $2 + 2$  could not turn out to be different from 4, and bachelors could not turn out to be married; hence (1) and (2) are a priori. Yet we could discover even today that water does not consist of  $H_2O$ , that Hesperus and Phosphorus are distinct, or that you are not human, but a robot (though we would have to make up fairly fantastic stories displaying these possibilities); hence (3) - (5) are a posteriori.

However, it could not turn out that I am not here. I could not find myself to be at a place now different from the place to which "here" refers when uttered or thought by me now; hence the statement

(6) I am here now

is a priori true. The same applies to the statements

(7) I exist now, and

(8) I am thinking now.

(6) - (8) exemplify contingent propositions a priori; they might be called Cartesian examples.

With the help of these notions, Kripke finally defines analyticity: a truth is analytic just in case it is both metaphysically necessary and a priori; more precisely, a truth is analytic iff its metaphysical necessity is a priori. Thus,  $2 + 2$  being 4 is analytic as is the bachelors' being unmarried, whereas all my other examples constitute synthetic propositions.

So far, Kripke confirms Kant who also did not recognize analytic a posteriori propositions and who also recognized the other three possible combinations. Nevertheless, Kripke and Kant differ fundamentally. The difference does not lie so much in their accounts of apriority which both conceive in a similar way: namely that a priori beliefs are held by epistemic subjects solely by virtue of their epistemic nature (although Kripke offers little more than a definition and a couple of intuitive examples, whereas Kant builds up an elaborate theory of judgments). The difference rather lies in Kripke's notion of metaphysical necessity which at bottom amounts to nothing else than a revival of Aristotelian essentialism and which is foreign to Kant. A symptom of this is that while Kripke is able to reproduce Kant's twofold dichotomy with his new necessary/contingent distinction and the shared a priori/a posteriori distinction, these

distinctions turn out to be logically independent: there are a posteriori necessities such as (3), and there are a priori contingencies such as (6).

In order to appreciate how radical this upheaval was one has to recognize how the revival of apriority was a by-product of the revival of metaphysical necessity. This is due to the obstinate tendency to view the concept of meaning from an exclusively or predominantly epistemological perspective. This tendency was dominant in the 17th and 18th century in which theories of meaning were treated as mere appendages to epistemology. It can also be found at many places in this century, e.g. in the logical positivists' verifiability theory of meaning or in the tradition of use theories of meaning which fall victim to similar distortions. This tendency inevitably has the consequence of blurring the difference between analyticity and apriority. Only if one clearly recognizes the ontological and epistemological double dimension of the concept of meaning, as Kripke did by insisting on the notion of metaphysical necessity, can the concept of apriority regain its independence. These remarks apply to Kant as well because he regarded ontology (with the exception of the ineffable *Ding-an-sich*) as thoroughly interwoven with epistemology. This is the basic reason for Kripke's outstripping of Kant.

Still, the two-dimensionality of the concept of meaning only reached maturity with Kaplan (1977). Although Kripke was able to show that intensions as developed by Carnap (1947) in his intensional semantics are suited to capture the modality of metaphysical necessity, he could not offer a comparable theoretical framework for capturing apriority. This was provided only by Kaplan's (1977) theory of indexicals and demonstratives – a fact which has not been fully recognized until now because the amount of indexicality in natural language which can be accounted by this theory has been grossly underestimated by most philosophers and even by Kaplan himself.<sup>10</sup>

Kripke's dichotomies indeed agree perfectly with Kaplan's theory. According to Kaplan, the extension of any linguistic expression in principle exhibits a twofold dependency: it depends, as Kaplan puts it, on the context of utterance, and it depends on the world of evaluation or on the circumstances<sup>11</sup> of evaluation. Kaplan calls the function describing both the dependencies of the extension of a give phrase the

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<sup>10</sup> Kaplan's own underestimation shows up in section XXII of Kaplan (1977) where he draws the negative, but according to Haas-Spohn (1995), ch. 4, wrong conclusion that his theory is unable to account for the cognitive significance of proper names. The general underestimation shows up for instance in the fact that, as far as I know, Haas-Spohn (1995), ch. 3, is the first attempt to interpret the hidden indexicality of natural kind terms described by Putnam (1975) within the framework of Kaplan.

<sup>11</sup> "Circumstances" is more general than "world", and rightly so. But for our purposes it suffices to conceive of circumstances of evaluation simply as possible worlds.

character of this phrase; for Kaplan, characters thus are the proper objects of a recursive semantics of natural language. In some cases these dependencies may run idle, but as already noted, this happens far less often than generally thought.

The twofold dependency is capable of capturing both of Kripke's dichotomies: The utterance of a sentence in a given context is necessarily true iff the sentence's character assigns "true" to it in that context and in every possible world. Examples are utterances of (1) and (2) in every context and utterances of (3) - (5) in any context belonging to our world. Otherwise the utterance of a sentence is either contingent or necessarily false. Furthermore, a sentence is a priori true iff it is true in every context, i.e., if it can be only truly uttered or thought of, as exemplified by (6) - (8); in any other case the sentence is a priori false or a posteriori. Here it must be observed that the world in which a given context is situated is a component of this context; it may be called a context world, which, however, may also function as a world of evaluation. Thus a sentence is true in a given context iff the character of the sentence applied to the context and to its context world as a world of evaluation yields the extension "true".<sup>12</sup> This explication finally entails that a sentence is analytic just in case its character assigns "true" to it in all contexts and all worlds of evaluation. It is this embeddability of Kripke's dichotomies into Kaplan's theory of characters which is guiding me in the sequel.

Are there any further examples of a priori sentences beyond the Cartesian (6) - (8) (or a priori beliefs expressed by those sentences)? Kripke's main example is this:

(9) The standard meter is one meter long.

Of course, this example has become outdated by modern means of length standardization. Apart from this it is obvious that this sentence is contingent: the standard meter might have been subject to changes in temperature and could thus have had a different length. At the same time it is a priori: whatever the length of the stick, it was defined as being one meter and, hence, could not be found to be different from one meter.

If we accept this example, as I think we in principle should<sup>13</sup>, it becomes apparent that it is a special case of a general pattern which can be more clearly discerned in the following sentence:

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<sup>12</sup> See, e.g., Zimmermann (1991), sect. 1.2, or Haas-Spohn (1995), sect. 1.2., for a more thorough discussion of these concepts.

<sup>13</sup> Kripke's example contains some complications, though, which have provoked intense discussion (see, e.g., Brakel 1990) and therefore may not be the best of its kind.



(10) The first to climb Mount Everest first climbed Mount Everest.

Sentences of this kind are systematically ambiguous. They have a so-called attributive reading according to which the example is to be understood in the manner of:

(11) Whoever first climbed Mount Everest, first climbed Mount Everest.

According to Kaplan's theory, the definite description "the first to climb Mount Everest" if read as in (11) refers to the world of evaluation; the predicate "first climbed Mount Everest" refers to the world of evaluation anyway; thus, (11) says that the person who first climbed Mount Everest in the world of evaluation, did this there. Hence (11) is analytic and consequently a priori in a way which is not of present interest.

However, sentences of this kind also have a so-called referential reading that I take to be the preferred one; read in this way my example becomes:

(12) The person who actually first climbed Mount Everest first climbed Mount Everest.

According to Kaplan's theory, the definite description in (12) refers, as the word "actually" is meant to indicate, to the context and not to the world of evaluation. Read in this way, the sentence is not necessary; Sir Edmund who first climbed Mount Everest in our context world might have failed to do so in other worlds of evaluation for various reasons. Yet, (12) is a priori: (12) is true in every context; whoever turns out to satisfy the definite description in the context world we know of him in advance that he also satisfies the predicate there. Hence, the referential reading is contingent and a priori.

The discovery of this ambiguity, which is so important because 70 years of best analytic philosophy had been systematically blind for the referential reading, is mainly due to Donnellan (1966), even though he first described it as a merely pragmatic phenomenon. Its interpretation within Kaplan's theory as just outlined<sup>14</sup> seems to me to be commonly accepted, at least in linguistic semantics. Therefore I shall keep using the referential/attribution distinction in the generalized sense of the projection onto Kaplan's character theory as displayed by (11) and (12). Having become fully aware of it, one finds it everywhere:

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<sup>14</sup> This interpretation is due to Stalnaker (1970) and Kaplan (1978); see also Heim (1991), sect. 1.3.

It is, for instance, connected with natural kind terms like "tiger", "water", "rose", "aids", "language". Consider the sentence:

(13) Water is the fluid we call "water".

Its behavior is just opposite to that of the "Mount Everest" example. It is analytic if the definite description "the fluid we call 'water'" is read referentially, whereas it is contingent and a priori, if read attributively. The attributive reading does justice to the fact that it is completely external to water how we name it and whether there are any beings around capable of talking about water. Moreover, it expresses our a priori knowledge; water cannot possibly turn out for us to be something different than what we call "water". Put more precisely: We may be wrong when taking something to be water and therefore calling it "water"; superficiality may even lead to wide-spread error of this kind. Nevertheless, most of what we, to the best of our knowledge, take to be water and hence call "water" must be water; we simply do not have any other basis for enquiring into the nature of water. Analogous remarks apply to other natural kind terms.<sup>15</sup>

Proper names can be treated in a similar fashion. Consider the sentence:

(14) Saturn is the planet called "Saturn".

If we read the definite description referentially, the sentence is analytic. Read attributively, it is another example of a contingent truth a priori. Again, our naming of the object is completely inessential to the object, but it is not possible that we discover that what we call "Saturn" is not Saturn.<sup>16</sup>

These explanations should by now have sharpened our senses for the phenomenon of the contingent (or synthetic) a priori and should have shown that its occurrence is wide-spread and systematic. Thus prepared, let us now turn to our main subject, namely to disposition predicates and the a priori propositions related with them. As far as I know, it has not yet been explicitly discussed in Kaplan's framework; moreover, it is more complicated and less clear-cut, yet it is full of interesting consequences of its own.

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<sup>15</sup> This thought, by the way, seems to lead to a direct justification of something like the principle of charity which Davidson (19##) takes to be axiomatic in his theory of interpretation.

<sup>16</sup> Both types of example, which are in fact much subtler than displayed here are discussed at length by Haas-Spohn (1995), ch. 3 and 4.

#### 4. *Disposition Predicates and Reduction Sentences*

Disposition predicates like "soluble", "magnetic", "digestible", "red", "obedient" or "intelligent" denote properties true of an object if it exhibits a certain typical behavior in certain typical test situations; for example, an object is water-soluble just in case it would dissolve if it were immersed in water. How to exactly understand this is one of the most notorious questions of twentieth century philosophy of science: In their program the logical positivists thought that epistemology should and, hence, could explain everything not "given", predicates whose predicability is not decidable by mere observation or sentences that describe unobservable states of affairs, in terms of the given, i.e. from observation vocabulary. For example, the predicate "water-soluble" does not belong to the observation vocabulary, because one cannot discern directly, but only in the relevant test situation, whether an object is water-soluble or not. Let us assume for the sake of our example that "is immersed in water" and "dissolves" are observation predicates. If I define

(15)  $x$  is water-soluble just in case: if  $x$  were immersed in water, then  $x$  would dissolve,

have I not given the desired explication of water-solubility? Not so, at least not in a manner acceptable to logical positivists. The reason is that the subjunctive conditional in the definiens of (15) is not yet explained; hence it is not yet explained how the truth condition of " $x$  is water-soluble" is determined by the truth conditions of " $x$  is immersed in water" and " $x$  dissolves". No other more acceptable explication was found; thus, it emerged that the program of the logical positivists could not be executed.<sup>17</sup>

Thereafter, a less demanding program was tried; the search for definitions of disposition predicates was replaced by the statement of so-called reduction sentences. Consider:

(16) If  $x$  is immersed in water, then  $x$  dissolves if and only if  $x$  is water-soluble.

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<sup>17</sup> Cf. Carnap (1936/37).

Here, this is the decisive advantage, all if-then-constructions are to be construed in the truth-functional sense of classical propositional logic; no unexplained subjunctive "if-then" appears. Moreover, thus understood, the reduction sentence is apparently true. However, this is its decisive disadvantage, it only yields - a conditional definition of water-solubility, i.e., no definition at all. Logical empiricism which succeeded logical positivism tried to turn this in a virtue by reducing the demands on reduction: what is not given needs to be only partially interpreted by the given, i.e., non-observation statements are somehow to be connected to observable facts in such a way that they acquire empirical relevance for observation statements, thus making them testable and confirmable by the latter. Indeed, any empirically-minded scientist would subscribe such an assertion without hesitation.

A prominent example for partial interpretations are given precisely by the reduction sentences for disposition sentences. Due to the validity of the reduction sentence (16) claims about the water-solubility of an object become empirically relevant and testable; you only have to put the object into water. Moreover, the validity of the reduction sentence does not derive from empirical facts; otherwise, if the reduction sentence would have to be tested or confirmed, the partial interpretation would become puzzling again. Rather, its validity seems to flow directly from our understanding of the predicates involved; i.e., the reduction sentence is analytically true as it should be for a partial interpretation.

However, it soon became clear that this cannot be the whole truth. One point is the existence of so-called multi-track dispositions which have different characteristic manifestations in different situations. The predicate "magnetic" served as an example. Different pieces of magnetic material show different characteristic behavior if brought near compass-needles, iron cuttings, or coils; therefore "magnetic" is characterized by several reduction sentences of the form (16). If put together, however, these sentences have synthetic consequences, e.g., that anything showing a given behavior near compass-needles also shows a given behavior near coils. Hence, not all of them can be analytic; and since they have an equal claim to analyticity, none of them is analytic.<sup>18</sup>

Even worse is the fact that reduction sentences of the form (16) for single-track disposition predicates such as "water-soluble" are, strictly speaking, false. The reason is obvious; we can easily think of circumstances in which an object is immersed in water, but does not dissolve, and vice versa. The object might be soluble, but not dissolve, because the water is already saturated with the kind of stuff the object consists of; a strong current in the water might lead to the dissolution of an insoluble object; and

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<sup>18</sup> Cf. Carnap (1936/37) or Stegmüller (1970), sec. IV.1.c.

there are many more bizarre physical possibilities and impossibilities that uncouple disposition and manifestation.<sup>19</sup> Hence, the reduction sentence needs a little softening:

- (17) If  $x$  is immersed in water and normal conditions obtain, then  $x$  dissolves if and only if  $x$  is water-soluble.

It is as common as it is obscure to say that the reduction sentence is thereby subject to a *ceteris-paribus*-clause. Some<sup>20</sup> even think that the whole of empirical science is to be put under reservations of this kind. Hence, in order to reach a metaphysical as well as an epistemological assessment of (17) we obviously have to gain a better understanding of our vague talk of normal conditions.

### 5. Normal Conditions and A Priori Reasons

To begin with, it is patently the task of the empirical sciences not to be content with the vague reference to normal conditions, but to inquire them in more detail (and also to examine deviant conditions). Their inquiry will yield a possibly very long list of concretely stated conditions. But precisely because the inquiry is empirical the equivalence between this list and our talk of normal conditions can not be analytic.

Another suggestion would be to claim that the normal conditions in (17) are by definition those conditions under which all and only water-soluble objects immersed in water dissolve. Reduction sentences such as (17) would then simply be analytic. As such this result is not wrong, as we will see in the next section; but it would be wrong to derive it from the suggested definition which is too generous insofar as it allows completely crazy conditions making (17) true by chance to be counted as normal conditions.

The third idea is the most literal; according to it normal conditions, though vague, are exactly those conditions that normally, usually, mostly obtain. However, this formulation can be read either referentially or attributively. Which reading is appropriate?

According to the attributive reading normality is to be assessed in the world of evaluation; conditions are normal if they usually obtain in this world. However, the

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<sup>19</sup> This was already noticed by Carnap (1956) - which is why he did no longer introduce disposition predicates via reduction sentences of the form (16), but instead developed what became influential as the received view of scientific theories; cf. also Suppe (1977).

<sup>20</sup> E.g. Hempel (1988) who prefers to speak of *provisos*.

extension of "water-soluble" varies then to an unexpectedly high degree for different worlds of evaluation. If, for example, the world is such that strong currents usually flow through water there, then only those objects which dissolve in water of that kind are water-soluble; and again there are more bizarre variations. As I said, this is unexpected. Intuitively I would think that because in our world sugar usually dissolves in water, other-worldly, possibly numerically distinct occurrences of sugar still belong to the extension of "water-soluble", whatever the conditions of water usually are in that other world.

The deeper reason for this intuition is this: Normal conditions are not those usually obtaining in the entire universe, but those encountered in the small space-time region inhabited by us. This reference to the here and now of us, a big old language community, shows that the normal conditions of the context world, not those of the world of evaluation are the right ones. Otherwise, it would not make sense to ask what would be normal in this sense in a world of evaluation where humans or even the earth do not exist. If nevertheless the extension of "water-soluble" in such a world is to be neither empty nor undefined, as it certainly should be, then this can only mean that normality is to be grounded in our context world.

This amounts to understanding our talk of normal conditions in a referential way; normal conditions are those conditions normally, usually, mostly encountered in the context world - whatever it is. Hence, when empirical scientists of our world put together the above-mentioned list of concretely specified conditions, this list, if correct, is necessarily equivalent, in the metaphysical sense, with the normal conditions (a fact consealed by the inevitable vagueness of "normally", "usually", and "mostly").

This, for one, clarifies the epistemological status of the modified reduction sentence (17). If the normal conditions are read referentially, (17) is a priori in the sense of unrevisability; it cannot turn out to be false. For, wherever in the context world an object being immersed in water dissolves despite being insoluble or does not dissolve despite being soluble, normal conditions obviously do not obtain (which is not to say), as already indicated, that normal conditions would be defined in this way); this much we know even if our knowledge about the actual normal conditions is poor.

This result, however, does not yet completely capture the epistemological role of the talk of normal conditions. Up to now talk of normal conditions has remained disturbingly vague, as has proposition (17). How, then, is it possible that something as vague as (17) is known a priori? This knowledge seems to me to be grounded in an a priori justificatory relation - which leads us full circle back to section 2. Instead of saying that the reduction sentence (17) with its reference to normal conditions is known

a priori, I propose the following reformulation which avoids referring to normal conditions:

- (18) Given that  $x$  is immersed in water, the fact that  $x$  is water-soluble is an a priori reason for assuming that  $x$  dissolves, and vice versa.

I already explained in section 2 how talk of conditional reasons is to be understood, namely as positive relevance under the given condition. But how is the "a priori" to be understood?

Apparently, the relation of being a reason a priori or of positive relevance a priori is not fixed forever. On the contrary, this is the point, relevant data can always emerge conditional on which the water-solubility of an object is not a reason for, and maybe even a reason against, its dissolution if immersed in water. The space of further reasons, counter-reasons and relevant conditions can only be unraveled by further inquiry. The relation of positive relevance being a priori therefore signifies that it only obtains initially as long as nothing else is known; we thus deal here with the second sense of the a priori explained in the first section.

From (18) it can be inferred that (16) is also a priori in this sense.<sup>21</sup> This yields the remarkable contrast that the reduction sentence is a priori in the sense of unrevisability if read as (17) and a priori in the other sense if read as (16). This contrast allows us to improve our understanding of normal conditions: they are precisely those conditions under which the a priori reason can be maintained and is thus confirmed. No claim is made about what the normal conditions actually consist in; it is up to science to find out about them. Yet their epistemological role is thereby sufficiently explained.

Finally, this account explains the apriority of (16) and (17). The assumption that normal conditions obtain is the a priori default assumption with which we start; hence, (16) is also a priori in this sense.<sup>22</sup> Furthermore, if the normal conditions are those under which the positive relevance stated in (18) continues to hold then no further conditions can invalidate this positive relevance; hence, (17) is unrevisable.<sup>23</sup>

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<sup>21</sup> This inference can be made precise in the setting of the theory of ranking functions; see Spohn (1991).

<sup>22</sup> Goldszmidt, Pearl (1992) explain in which way the doxastic models referred to in footnote 7 (to which I have implicitly alluded all the time) are closely connected to so-called default logic.

<sup>23</sup> The account also explains why normal conditions should not be defined so as to make (17) true. There may be strange conditions under which the positive relevance of (18) does not hold any more. But then there may be still stranger compensatory conditions in addition under which the positive relevance of (18) is restored. According to the definitory approach this pair of conditions would belong to the normal conditions. Not so according to my account, and rightly so, it seems to me.

## 6. *The Categorical Base of a Disposition*

The epistemological considerations of the last section have been my main concern; they leave open, however, the ontological status of the reduction sentence (17). For the sake of completeness I want to address this issue, too, though I shall not reach a definite conclusion.

We have first to understand what the (categorical) base of a disposition is: It consists just in the inherent properties of an object which are responsible for the relevant behavior of the object.<sup>24</sup> In the case of water-solubility the base consists in the bonds holding together the molecules which an object is made of; these bonds have to be sufficiently tight to form a solid object, but not so tight that they withstand to the attack of H<sub>2</sub>O dipoles. The digestibility of food is based on a very complex biochemical structure. The assumption that intelligence is simply based on a rich connectivity of the brain would be neuro-physiologically very naïve. Indeed I do not want to assert that we can identify a base for every disposition; for example, it is hard to see what the base of obedience should be.

The crucial question is now: what is the relationship between a disposition and its base? The simplest answer is to claim that they are identical, i.e., they are the same property.<sup>25</sup> Just as we should say that being water is the same property as consisting of H<sub>2</sub>O, we might say that being water-soluble is the same property as having certain inter-molecular bonds; identities such as these are always metaphysically necessary.

Prior et. al. (1982), sect. II, (and Lewis 1986, pp. 223 f. in part) disagree. One of their arguments (p. 254) is to insist that dispositions are defined by propositions such as (15). This does not solve our problem, however, which precisely consisted in finding out how best to understand (15).

Their first argument is that there conceivably are many different mechanisms showing the relevant behavior under suitable conditions. In this case, something would be water-soluble not by having the one and only base of water-solubility, but by having one of many bases. We have to distinguish two problems here:

First, the argument suggests the possibility that if we examine all water-soluble objects in our world we may find two or more causal mechanisms leading to their dissolution, which are so different that they cannot be captured by a unified description. Water-solubility then has two or more different bases in our world and can therefore

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<sup>24</sup> Cf., e.g., Armstrong (1968), pp. 85-88, or Prior et. al. (1982).

<sup>25</sup> Armstrong already argues for such a realistic understanding of dispositions; see his (1968), pp. 85-88.



not be identified with any one of them. However, this kind of problem affects any essentialist theory of identity. Surely, water in our world could have been found to be occurring in two different forms, e.g. as H<sub>2</sub>O and as XYZ; Putnam (1975), p. 241, mentions the nice example of jade which indeed occurs in two different forms. In this case it is plausible to assert that jade essentially has one or the other form; and it certainly remains a vague matter to determine which number of different forms makes this response implausible. This does not yet decide whether the same position is acceptable in the case of water-solubility. Still, the problem is of a more general kind, not one of dispositions in particular.

So, let us put aside this problem by assuming that a disposition has only one base in each world. According to the argument of Prior et al. it is still possible, however, that the bases differ in different worlds. In this case, we can still maintain that "x is water-soluble" means the same as "x has the basis of water-solubility". But this is ambiguous in a manner well-known by now, the definite description "the base of water-solubility" can be read attributively or referentially.<sup>26</sup> Since the reference to normal conditions was already to be read referentially, one could think that this is appropriate now as well. I am not sure at all:

Consider a piece of sugar. In our world it is water-soluble. Now, move it into another world of evaluation. It does not change internally; and the same normal conditions obtain as do in our world. Yet, the piece of sugar does not dissolve in water in that world; somehow that world is governed by different causal laws, and hence different objects with different internal make-up dissolve in water. Should we now say that the piece of sugar is water-soluble in that world as well, in spite of its not dissolving? This would be the referential reading. However, in this case the attributive reading seems to me to be more plausible; according to it the piece of sugar is water-soluble in our world, but not in that other world.

This response seems appropriate for one-track dispositions; dispositions of this kind seem to be especially tightly bound up with their characteristic manifestations. But other examples may be different. If we perform the same thought experiment with multi-track disposition predicates, e.g. with "magnetic", we might rather come to the conclusion that an object which is magnetic in our world is magnetic in this queer world of evaluation as well. The same is true for predicates whose dispositional character is less obvious, e.g. for the predicate "red". On the whole, the situation seems to me to be quite indeterminate.

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<sup>26</sup> Prior et al. (1982) do not use the framework of Kaplan, but some of their formulations suggest that they have this ambiguity in mind, too.

This finally affects the ontological status of the modified reduction sentence (17). If "water-soluble" is read attributively as indicated, (17) is necessarily true, i.e. true in all worlds of evaluation. Hence, having already recognized (17) to be a priori, (17) turns out to be analytic. If, on the other hand, "water-soluble" is read referentially, which, as just remarked, may be appropriate for other disposition predicates, then (17) would be only true in all worlds, allowed by our physical laws, but not necessarily true; thus, reduction sentences would turn out to be another example for contingent truths a priori.

### 7. Outlook

If my analysis of dispositions is reasonable and gives the notion of reasons a priori an essential role to play, then major epistemological consequences, in particular concerning coherentism and skepticism, seem to ensue. As a kind of appendix, I want to briefly indicate how these consequences might come about.

To begin with, it is clear that secondary qualities are dispositions as well, i.e. dispositions to affect our senses and our minds in a particular way under suitable circumstances; indeed, I listed "red" as one of my examples. Hence, all of what I have said in section 4 and 5 also applies to secondary qualities; instead of the reduction sentence (16) I could equally well have discussed the reduction sentence:

(19) If I look at an object, then it is red if and only if it looks red to me.<sup>27</sup>

If (18) is a good analysis of what is intended by (16), then we may also proceed from (19) to:

(20) Given that I look at an object, the fact that it looks red to me is an a priori reason for assuming that it is red, and vice versa.

Now, not only do some objects look coloured to us, the whole world has the ever-lasting disposition to appear to us in this way and that way. This suggests a generalization of (20):

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<sup>27</sup> This would have been inadvisable, however, since this example is burdened by particular problems. I say more about these problems in Spohn (1997a) where I have more extensively discussed the epistemological and the ontological status of (19) within the same theoretical framework.

- (21) Given that someone looks at the situation in which  $p$  might realize, the fact that it looks to him as if  $p$  is an a priori reason for others as well as for himself to assume that  $p$ , and vice versa.

It is a huge step from (20) to (21), but a promising one. If (21) is true it provides a coherentist link between a physicalistic and phenomenalist base of empirical knowledge entailing that none of the two is really basic in the foundationalist sense; and it provides an a priori, though defeasible argument against skeptical doubts. Indeed, I believe (21) to be universally true.<sup>28</sup> However, it is all too obvious that it takes a long way to defend this in all its details.<sup>29</sup>

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<sup>28</sup> In the attempt to guard against skepticism Kutschera (1994) tried to establish analytic relationships between phenomenalist and physicalistic statements. By replacing this analytic relation through a priori positive relevance this suddenly appeared very plausible. And so I came to ponder (21).

<sup>29</sup> In Spohn (1997b) I tried to take it, still with some short-cuts, though.

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