Disposition Ascriptions as Suppositions

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Declaration of Originality

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Contents.

1 Introduction.

Dispositions involve an apparent conditionality, where this conditionality somehow relates behaviors with dispositional properties. That is, when describing dispositions, it is common to use 'if, then' type constructs. These conditional expressions usually involve the manifestation of a behavior in response to an associated stimulus.

These conditional and behavioral features, while seemingly indispensable to our understanding of dispositionality have proven difficult to account for. There are well known objections to extant analyses of dispositions in terms of conditionals. What's more, any account of dispositions appealing to counterfactuals is subject to familiar objections to counterfactual conditionals and their associated metaphysical costs. The metaphysical costs associated with analyses of dispositions in terms of counterfactual conditionals are particularly unattractive to those who endorse a certain strong kind of positivist empiricism.

In this thesis I explore the possibility of giving an account of dispositions in terms of Dorothy Edgington's (1986) suppositionals, rather than in terms of standard material and counterfactual conditionals which are usually involved in conditional analyses of dispositions. The result is an account that captures the apparent conditionality of dispositions and their behaviors while avoiding both the standard counterexamples to these existing analyses and their associated metaphysical costs. As such, this

suppositional account of dispositions may be of interest to those who endorse a certain strong kind of positivist empiricism.

The structure of the thesis is as follows:

In Chapter 2 I present a selective review of the relevant literature. I outline the way in which dispositions are related to, or perhaps imply, behaviors, and describe the origin of attempts at capturing this relationship in terms of conditionals. I present this overview in a way that suggests there is an interesting analogy between attempts at understanding the conditionality of dispositions in terms of observable behaviors and behaviorist approach to mental states.

I begin with Rudolf Carnap's (1936, 1956) early attempts at accounting for dispositions in observational, extensional terms and argue that while there is something obviously correct about understanding dispositions in terms of observable behaviors, this straightforward, empirically robust behaviorist approach to dispositions generates a number of serious problems, both analytic and epistemic.

In Chapter 3 I set out the standard modes in which evidence of observable behavior is taken to motivate conditional accounts of dispositions.

I outline the now commonly discussed Simple Conditional Analysis of dispositions; a framework that analyses dispositionality in terms of material and counterfactual conditionals. I then discuss some of the standard counterexamples to that analysis, and

related analyses, in order to motivate a rejection of, or at very least a healthy suspicion of, the Simple Conditional Analysis, its variants and sophistications.

I then introduce Edgington's (1986) arguments against indicative conditionals in capturing the way in which we make use of apparently conditional (if, then) structures in natural language. I demonstrate that the four assumptions that Edgington argues must be adopted by anyone who claims that indicative conditionals capture common conditional locutions are especially representative of the reasoning involved in the standard counterexamples to conditional analyses of dispositions.

Given that Edgington's arguments are mostly against indicative conditionals as a means of capturing natural language conditional locutions, and that the Simple Conditional Analysis crucially departs from Carnap's analysis insofar as it incorporates a counterfactual conditional, (a semantics for which was not available to Carnap), my claim is not that Edgington's arguments constitute a good reason for rejecting the Simple Conditional Analysis. Rather, I argue that each of the four assumptions discussed by Edgington are presupposed by any account that is subject to the standard counterexamples to the Simple Conditional Analysis. If these assumptions are not made, regardless of the type of conditional involved in the analysis, the standard counterexamples will not follow.

I conclude that an account not presupposing these assumptions could, by contrast, present a plausible alternative to extant analyses, such as the Simple Conditional Analysis.

In Chapter 4 I advance an account of dispositions in terms of Edgington's suppositionals. In doing so I propose that a conditional analysis actually implies at least 3 distinct conditional claims. The Simple Conditional Analysis incorporates 3 elements: a stimulus condition S, a manifestation condition M, and what Bird (2009) calls a covert disposition ascription D. I argue that upon the supposition of any pairing of these three elements, an inference is licensed to the third, and that *these inferences capture the bulk of our ordinary use of dispositional language*.

The three inferences, and so the three activities we carry out with dispositional language, are a predictive inference, an evidential inference, and an inference to the best explanation. This explains our normal reasoning involving dispositions, the intuition that dispositions involve some sort of conditionality, and the intuition that dispositions somehow involve, imply, or are implied by behaviors, without also appealing to counterfactual conditionals, and so without taking on their metaphysical costs.

In Chapter 5, having presented the suppositional account, I turn from the subject of how we get from our folk practices involving dispositions, to the sorts of metaphysical commitments that beliefs in dispositions entail. I do this by presenting a variety of functionalism about dispositions.

In doing so, I largely follow the sort of 'Canberra Plan' approach that is endorsed by David Lewis (1970, 1972). I argue that the ordinary platitudes, delivered by our folk understanding of physical objects and phenomena associated with a certain disposition, fix the reference of the associated dispositional concept. It is then a matter for empirical

disciplines, such as the sciences or even our common interactions with the physical world, to determine whether or not the thing to which those platitudes have referred, actually exists or not. This can be understood as a sort of realizer functionalism, according to which the dispositional *property* is identified with its realizer, rather than its role, but differs from some other accounts insofar as the realizer is a token property, in virtue of which it plays the functional role, and that similar token properties are of the same dispositional type (whether this can actually be *called* functionalism is open to debate. Just as Lewis (1999, p.307) is unsure as to whether or not he is a functionalist, so too am I).

In Chapter 6 I provide both a defense and an elaboration of my suppositional account, partly using Michael Fara's (2005) account of dispositions in terms of what he calls 'habituals' as something of a foil. I respond to the potential criticism that in dispensing with counterfactual conditionals, and the possible world semantics with which they are associated, my account is not able to accommodate the sorts of antecedent assumptions of 'normal conditions' which often accompany disposition ascriptions. In response, I argue that the suppositional account allows for the inclusion of whatever antecedent suppositions one wishes to include in their suppositions concerning dispositions. These antecedent suppositions will be largely determined by the beliefs that one has concerning the disposition in question, combined with relevant context and circumstances surrounding the dispositional behavior.

This suppositional account has the advantage of retaining the empirical attractiveness of early, extensional, accounts of dispositions while *also* retaining much of the expressive

power of the later counterfactual accounts. In addition, it better captures our folk understanding of and use of dispositional concepts, and avoids the standard counterexamples to extant conditional analyses of dispositions.

2 Dispositions and Behaviors.

2.1 Introduction.

Dispositions involve behaviors. If I were to ask you what it means for something to be fragile, you will presumably respond, at least partly, in terms of the ways in which objects behave; 'to be fragile is to be easily damaged' for instance. Being damaged is a behavior potentially exhibited by something that is fragile. A similar response will be provided for any disposition. Involving some sort of behavior is what it is for something to be a dispositional property and not some other sort of non-dispositional, perhaps categorical, property [1].

In this chapter I will provide a selective overview of the literature concerning dispositions. My main goal is to provide context and background for the discussion that follows throughout this thesis. I briefly outline and assess the claim that dispositions can be

[1] This entailment between dispositions and behaviors is usually expressed as an entailment between dispositional ascriptions and some sort of conditional. Upon this view, dispositional ascriptions entail conditionals while categorical ascriptions do not. There is, of course, a great deal of discussion and disagreement concerning this claim. To deny that there is any such entailment is essentially to deny that there are any dispositional properties. For an interesting discussion on the nature of any entailment between property ascriptions and conditionals, see Mellor (1972) who holds the view that both dispositional and categorical properties entail conditionals. For a dissenting view see Prior's (1982), and Mellor's response to Prior in his (1982).

accounted for *entirely* in terms of their behaviors, in the sense that behaviors exhaust their existence. In doing so, I present the chapter in terms of an interesting analogy between attempts at accounting for dispositions in terms of their associated behaviors, and the approach that is known in the philosophy of mind as behaviorism.

2.2 Behaviors and Behaviorism.

A behaviorist approach to dispositions is most consistent with a particular characterization of dispositions that I will refer to as 'pure dispositions'. A Pure Dispositions Thesis states that:

(Pure Dispositions Thesis) Some dispositions do not have an underlying causal base that is non-dispositional [2].

By 'underlying causal base' I follow the account of Prior, Pargetter, and Jackson (1982, p.251) which states that:

[2] This sort of claim is sometimes called a 'pure powers' thesis (Bird 2009). I follow Bauer (2012) in the use of the terminology 'pure disposition' because I take a power to be a *type* of disposition.

> The property or property-complex of the object that, together with the… - the antecedent circumstances - is the causally operative sufficient condition for the manifestation ‘ of that disposition.[3]

A ‘non-dispositional’ causal basis would be a categorical property. Categorical properties are contrasted with dispositional properties in that they are not usually understood as entailing any sort of behavior or conditional. According to Ellis and Lierse (1994, p.28), categorical properties ‘don’t do anything; they merely *characterise*’.

Physical dispositions, including pure dispositions, are not readily observable. In this way, they are rather like the mental states of other people or animals [4]. By simply looking at an object, I cannot immediately know, ordinarily, what dispositions it possesses. Likewise, by simply observing another person or animal, I cannot immediately know, ordinarily, anything about what, if any, internal mental state or states it is in. This lack of direct empirical access to mental states has led some, such as Armstrong (1968), Ryle

[3] Prior, Pargetter, and Jackson include in their account what they call ‘surefire’ and ‘probabilistic’ dispositions. I have omitted these features from their claim, as they are not relevant to my following discussion. If that is not satisfactory, consider my use of their account to be of the ‘surefire’ variety.

[4] Where there may be ambiguity, I will distinguish between physical and mental dispositions by using the term ‘physical disposition’. Otherwise, it should generally be assumed that by ‘disposition’ I mean ‘physical disposition’ and not ‘mental disposition’.

(1980), and Wittgenstein (1953), to understand them in terms of the behaviors associated with them [5].

According to the behaviorist account of mind, to be in a certain mental state is just to exhibit, or to be disposed to exhibit, the behaviors that we associate with that mental state (Armstrong 1968, pp.57-58; Ryle 1980, ch. V). Armstrong (1968, p.57) points out that 'the Behaviorists emphasized the tremendous importance of dispositions in unfolding the nature of the mental concepts'. For example, by simply looking at someone who is not swimming, I cannot know whether or not this person knows how to swim. To know how to swim is to be disposed to exhibit a certain set of behaviors under certain conditions (Ryle 1980, pp.33-34). We generally associate with the mental state of knowing how to swim, such behaviors as actually swimming when falling into a sufficiently deep body of water. So, if I want to learn whether you know how to swim, all I need to do is throw you off a boat and see what happens.

A similar approach has been taken towards *physical* dispositions. This lack of direct empirical access to dispositions led to attempts at analyzing away this troubling feature. According to this approach to dispositions, something has a particular disposition just if it exhibits the behaviors we associate with that disposition. For example, we generally

[5] I am not attributing to Armstrong, Ryle, Wittgenstein, or anyone else, any particular version of behaviorism. Indeed Armstrong (1968, p.55) points out that whether or not Wittgenstein is indeed a behaviorist at all is 'hotly debated' and that both Wittgenstein and Ryle 'deny that they hold this doctrine'. Ryle (1980, p.308) states of his work that it 'will undoubtedly, and harmlessly, be stigmatized as "behaviorist"'.

associate with the disposition of fragility, such behaviors as cracking, breaking, smashing or similar behaviors, in response to being dropped or struck, or similar stimuli. I cannot, ordinarily, know, simply by looking at it, and without appeal to experience, whether or not the glass that I was provided at lunch is fragile. To know whether or not it is fragile, I would need to throw it off a table and see if it breaks.

This is the sort of approach famously taken by Carnap (1956). Distinguishing between an 'observation language' and a 'theoretical language', (1956 p.38), Carnap states of the observation language (L_O) that:

> All primitive predicates in this language designate directly observable properties or relations of observable things or events; and a non-primitive term is admitted in L_O only if it can be defined on the basis of the primitive terms by an explicit definition in an extensional form, that is, not involving either logical or causal modalities (1956 p.63).

Carnap carries out this form of extensional definition in terms of the stimulus and manifestation, or what he calls stimulus and response, conditions, that we associate with a disposition. For example, we might say that something *x* is fragile *iff*, if *x* is struck, *x* breaks. Carnap refers to this sort of extensional definition as a 'reduction sentence' (1936, 1956 p.41). If a disposition can be captured by a reduction sentence, then a new predicate attributing it can be admitted to the observation language. Carnap points out that the behaviorist takes the same approach to mental states:

> Behaviorism… led often to the requirement that all psychological concepts must be defined in terms of behavior or behavior dispositions. A psychological concept ascribed to a person *X* by the investigator *Y* either as a momentary state or process or as a continuing trait or ability, was thus interpreted as a pure disposition D_{SR} of such a kind that *S* was a process affecting the sensory organ of *X* but observable also by *Y*, and *R* was a specified kind of behavior, also observable by *Y* (1956 p.71).

Physical dispositions and mental states or mental dispositions can both be understood in terms of the behaviors that they produce under certain conditions. That is, any theoretical term, be it physical or mental, should be describable in terms of its behaviors, actual or potential.

This behaviorist approach provides a strategy for learning about the dispositions that a thing possesses. If I want to know whether a certain ball is bouncy, all I need to do is drop it and see if it bounces. If indeed it does bounce, then the ball is bouncy, and if it does not bounce, then it is not bouncy. When understood in this way, behaviorism can be used as a methodology in various sciences. Methodological Behaviorism is usually understood as a doctrine concerning the appropriate methodology of psychology [6]. According to methodological behaviorism, psychological sciences 'as a purely objective and

[6] Skinner, who states that 'terms like "mind," "will," and "thought" are often simply synonyms of "behavior"' (1977, p.2) is often cited as an example of someone who applies this sort of view to scientific practice (Graham 2014).

experimental branch of natural science' should retain empirical respectability by being concerned not with unobservable internal mental states but with observable behaviors (Watson 1913, p.158). By analogy, a behaviorist approach to physics would amount to the claim that physics, or whatever other science one might wish to take a behaviorist approach to, should be concerned with the observed behaviors of its subject matter. If so, sciences that involve dispositional terms *in general*, like mass, charge, soluble, durable, flammable and so on, will be concerned with the behaviors exhibited by the things that are said to possess those properties, and not with the unobservable internal states of those things. Carnap seems to endorse, or is at the very least aware of, something like this sort of procedural or methodological approach, holding that a disposition predicate is admissible into the observation language just if an observer is able, through experimentation, to produce the stimulus and manifestation conditions (1956, p.64) [7].

Methodological behaviorism is standardly distinguished from what might be called philosophical or analytic behaviorism. This is not a claim about how to practice science, but rather about the *meanings* of the terms that we employ. To say that a particular person knows how to swim is to say that person will, *ceteris paribus*, exhibit the behaviors consistent with knowing how to swim [8]. That is, claims that we make about mental states are, on the whole, claims about certain behavioral states and not about unobservable,

[7] These testing procedures will be discussed later in this thesis, primarily in chapters 4 and 5.

[8] The use of *ceteris paribus* and similar conditions is discussed in chapter 6.

internal mental states. Analogously, analytic behaviorism as applied to dispositions more generally, amounts to a claim about the meanings of the disposition term and not about how science should approach or treat something said to possess that disposition. By 'soluble' we mean 'dissolves when placed in water', or something along those lines.

On a pure behaviorist approach to the mind and on the analogous approach to dispositions in general that I have sketched above, no reference is necessarily made to internal mental or dispositional states. Throwing you off a boat does not, on the behaviorist approach, grant me empirical access to your internal mental states. By observing you swimming, or not, I do not somehow observe that you possess a certain internal mental state; knowing, or not, how to swim. Rather, the behavior of swimming, or not, *just is* knowing, or not, how to swim [9]. Likewise, if I state that a certain glass is fragile, what I mean is that it will break when struck. I am not necessarily making some extra claim about some unobservable, perhaps microstructural state of the glass. Rather, in saying that the glass is fragile, what I mean, and all that I mean, is that it will exhibit certain behaviors (like breaking) under certain conditions (like being struck). No extra claim about unobservable states is implied.

[9] This amounts to a very pure or perhaps idealized and naïve form of behaviorism that, to my knowledge, has not been adopted, or at the very least, has not been espoused in the literature. I have in mind Ryle's stress on the distinction between 'know how' and 'knowledge that'; but as acknowledged in a previous footnote, even Ryle is not a straightforward behaviorist of this kind.

2.3 Problems with the behaviorist approach.

Despite having some intuitive appeal, to an empiricist, there are a number of well-known problems with behaviorism. Some of the standard problems behaviorism faces tend to involve explicitly mental phenomena without a dispositional analogue [10]. Given that my focus is on physical dispositions, and not on the philosophy of mind, I will largely ignore those problems that apply specifically to the philosophy of mind.

One problem with Behaviorism is that it seems possible for someone to be in a certain mental state while not exhibiting the associated behaviors. For example, we generally associate certain behaviors with being afraid (fleeing, screaming, panicking, shaking, and so on). Consider someone who is faced with a situation in which they are genuinely afraid, but do not wish to appear afraid, for whatever reason. Perhaps this person is being harassed by a wild animal and, while frightened, believes that giving the appearance of not being frightened might prevent an attack. The pure behaviorist, like the animal, will observe that this person is not exhibiting the behaviors associated with fear and infer that they are not afraid. In this case, the person is in the mental state of being afraid but is in

[10] An example of such a thing is qualia. Qualia are the qualitative characters that certain experiences are said to have. That is, while someone is in a state of pain, there is an extra qualitative experience of *what it is like* to be in pain (Nagel 1974). Behaviorism is sometimes criticized as not being able to account for qualia (Place 2000). Qualia, however, seem to have no analogue in physical dispositions. They are uniquely mental phenomena, if phenomena at all.

the behavioral state of being unafraid. I will refer to this class of problem collectively as 'confounders' or 'confounding conditions' [11].

Secondly, a person might be in the behavioral state of being afraid while being in the mental state of being unafraid. Consider an actor in a play or film. This actor, while unafraid, believes that giving the appearance of being afraid might entertain their audience or provide them with some other benefit. This belief, combined with the desire to achieve whatever it is that they believe can be achieved, motivates the actor to exhibit the behaviors associated with being frightened, even though they are not actually frightened. Following Johnson (1992, p.232) these sorts of problems are generally referred to as 'mimics' or 'mimicking conditions'. I will follow this convention.

[11] There are a number of distinct types of confounders that each present their own problems for analysis of physical dispositions. Use of the terms 'mask' seems to have originated in Johnson (1992). Bird is the originator of the antidote counterexample (1998, 2004, 2009). Bird's antidotes are a sophistication of the masking counterexample and are designed to block Lewis's (1997) Reformed Conditional Analysis. Martin's (1994) special case of a confounder is a variety of what he calls a 'fink'. The discussion in this section does not need to be sensitive to this distinction between different varieties of confounding condition. As such, the distinction will be largely ignored in this chapter.

2.4 The Standard Analytic Problems.

These two problems with behaviorism are directly analogous to a set of well-known problems for analyses of dispositions, the canonical presentations of which can be found in Martin (1994), Johnson (1992) and much discussed and elaborated upon throughout the literature [12]. Just as it is possible for someone to be in a certain behavioral state while not being in the associated mental state, so too is it possible for some*thing* to behave a certain way while not possessing the properties that we generally associate with those behaviors (in mimicking cases), or, to possess the properties that we associate with a certain behavior while not exhibiting that behavior (in confounding cases). To be in a behavioral state of fear is to exhibit behaviors such as fleeing and screaming. To be in an analogous dispositional state of fragility, for example, is to exhibit behaviors such as breaking upon being gently struck. Examples of these sorts of problems are confounding conditions, such as masks and antidotes, and mimicking conditions.

Recall that dispositions, according to Carnap, are to be accounted for in entirely extensional terms and as such are to involve neither logical nor causal modalities (1956 p.63). Carnap outlines this as follows:

[12] Counterexamples to conditional analyses of dispositions are so discussed in the literature that providing anything like a comprehensive list of such discussions is impractical for the purpose of this thesis. For a *highly* selective and limited overview, see, for example, Bird (2009, ch.2), Choi (2006, 2008, 2011, 2012), Manly and Wasserman (2008, 2012), and Lewis (1997). Choi and Fara (2014) is also an excellent resource.

> Suppose that there is a general regularity in the behavior of a given thing of such a kind that, whenever the condition *S* holds for the thing or its environment, the event *R* occurs at the thing. In this case we shall say that the thing has the disposition to react to *S* by *R*, or for short, that it has the property D_{SR} (1956, p.63).

Carnap makes the further claim that the regularity that holds between the stimulus and manifestation conditions associated with some disposition *must hold without exception* (1956 p.66). From this claim, Carnap derives two consequences (1956 p.67):

1. 'If the thing *b* has the disposition D_{SR} and the condition *S* is fulfilled for *b*, then it follows logically that the result *R* holds for *b*.

   Therefore:

2. If *S* holds for *b*, but *R* does not, then *b* cannot have the disposition D_{SR}.'

What Carnap does not explicitly state, but what requires explicit statement here, is that there is a third derivable consequence. That is:

3. If *S* holds for *b* and *R* also holds for *b*, then *b* must have the disposition D_{SR}.

Claims 1 and 3, having been explicated, can be restated in informal terms as the biconditional claim:

4. The thing *b* has the disposition D_{SR}, if and only if, if the condition *S* holds for *b* then the condition *R* holds for *b*.

This being the case, if some disposition is stimulated, then it 'follows logically' that the disposition will manifest (1956 p.67). So, if the disposition possessed by some object is stimulated, but does not manifest, then it follows logically that the object does not possess the disposition (1956 p.67). This is the confounder problem.

To illustrate this problem, consider the type of fragility that we associate with such behaviors as breaking, cracking, or shattering, in response to the application of an appropriate manner of force, such as being struck or dropped. Now suppose that some object is genuinely fragile and is struck with sufficient force that it should break. Like the frightened person who did not display their fear due to some extra mental state, the fragile object may not break due to the presence of some extra state, such as being surrounded by a protective wrapping [13]. This shows that it is possible for something to be in a certain physical state while not being in the associated dispositional state.

The above-mentioned claim 3 is subject to the mimicking problem. To illustrate this sort of problem, notice that it is also possible for something to behave as though it possesses

[13] This particular example of a confounding condition is usually referred to as a 'mask'. Some, such as Fara (2005) hold that masks are the most problematic of the counterexamples.

a certain physical disposition when in fact it does not. Consider an object that is not at all fragile. This highly durable item is rigged with extremely powerful explosives such that if it is struck with even a very small amount of force, the explosives will detonate and the object will break (Bird 2009, p.29) [14]. This object exhibits the behaviors that characterize fragility - breaking when gently struck – even though it does not possess the associated disposition. This example is analogous to the actor who, despite being unafraid, behaves as though they are. That is, it shows that it is possible for something to manifest dispositional behaviors while not possessing the associated dispositional property [15].

The confounder and mimicker problems are usually presented as problems for *analyses* of dispositions. That is, if what we *mean* by 'fragile' is something like 'breaks when struck', then if we adopt rules as outlined by Carnap (1956), we also mean first, that if something does not break when struck, it is not fragile, and second, that if something does break when struck, then it is fragile. *Purely in virtue of the meaning of the term* 'fragile' we are then forced to attribute fragility to objects that we might not otherwise believe are fragile, and may in actual fact not be fragile, and we are likewise forced *not* to attribute fragility to objects that we might otherwise believe *are* fragile, and may in actual fact be fragile.

[14] In Johnson's (1992, p.232) example of mimicking the extrinsic condition that caused the breaking of the durable object was an angel who had taken a dislike to the object.

[15] In a previous version of this thesis, I used language that was unclear, here and elsewhere. I think one of my examiners for pointing this out and suggesting the clearer alternative that I have used here and elsewhere.

The following example captures the potential for misattribution of dispositions to objects. Suppose there are two glasses. One is fragile while the other is not. Each is wrapped in a protective film that would prevent a fragile glass from being broken when struck or dropped. Both glasses are dropped, and neither breaks. In this case, both glasses exhibit the dispositional state of being durable even though only one of the glasses is genuinely durable. According to rule 3 that was derived from Carnap's other rules, *neither glass*, even though one is actually fragile, can be said to be fragile.

Problems such as those that have been discussed above have led many to attempt similar analyses using counterfactual, rather than material, conditionals [16]. Ryle, for example, states that:

> When we describe glass as brittle, or sugar as soluble, we are using dispositional concepts, the logical force of which is this. The brittleness of glass does not consist in the fact that it is at a given moment actually being shivered. It may be brittle without ever being shivered. To say that it is brittle is to say that if it ever is, or ever had been, struck or strained, it would fly, or have flown, into fragments. To say that sugar is soluble is to say that it would dissolve, or would have dissolved, if immersed in water (1980, p.43).

[16] A relatively early discussion of this approach appears in Goodman (1954 (reprinted 1983, p. 33)) who states that 'the interrelated problems of dispositions, counterfactuals, and possibles are among the most urgent and most pervasive that confront us today'.

More formally, such an account would say something like:

Something is fragile *iff*, if it *were to be* struck, then it *would* break.

Again, this does indeed seem to capture much of the intuitive meaning of what it is for something be or to have a disposition. Indeed, as I look at the mug on my desk, I do tend to believe that if it *were* to be dropped to the ground, even though it has not been and hopefully will not be, then it *would* break.

The main problem with this approach is that it unfortunately takes something of a backward step. Carnap's original reason for providing the reductive account that he did was to secure empirical respectability by eliminating unobservables from our account of dispositions. This is in keeping with the general, empirical, behaviorist attitude. The major reason for providing any sort of behaviorist account of some phenomenon, as people have done with mental states and as Carnap outlined with dispositional states, is to replace reference to unobservable internal states in favor of observable behaviors. But the use of counterfactual conditionals reintroduces exactly the feature that behaviorists attempt to eliminate. Notice that in the counterfactual version of the analysis of fragility that I provided above, it was stated that something *would* come about if something else *were* to happen. But what is observable about states that *will* or even *might* come about in response to states that explicitly have not *actually* come about? The notion of *possibility* has been introduced here. Merely possible events or states of affairs are not observable at all. This is one of the general problems with behaviorism that seems particularly relevant to the dispositional analogue of behaviorism – that of attempting to

provide an accurate account of dispositional or mental terms without reference to dispositional or mental states.

The line of criticism here might be thought unduly realist about the existence of the allegedly confounded disposition, and thus begging the question against the behaviorist approach. A very strict behaviorist might disagree with my assertion that one of the glasses in my above example was fragile and that the other was not. They might respond that in exhibiting the behaviors that they did, neither glass is genuinely fragile, as I have asserted. I respond to these sorts of criticisms in later chapters. Essentially I attempt to reconcile the empiricist appeal of behaviorism with the realist intuition that a physical disposition may exist even when it is not manifested, and that a disposition may not exist, even when behaviors associated with that disposition are manifested.

2.5 Epistemic Problems.

While the standard problems are generally treated as analytic, there are also a number of very closely related epistemological issues mirroring them. Consider an epistemological interpretation of the mimicking problem. How can the behaviorist towards mental states distinguish between, on one hand the state of being unafraid, and on the other the state of being afraid while also desiring to appear unafraid and possessing the skills to exhibit the behaviors associated with being unafraid? Arguably, without positing further beliefs, they cannot. Given that both the unafraid person, and the frightened person who acts unafraid will present the same behaviors, there is no apparent means of *knowing* whether they are

afraid or unafraid. That is, there is no apparent means of knowing whether or not they possess the property that is associated with these behaviors. The mimicker problem, and also the set of confounder problems, is not *just* a problem for the meaning of the terms that we employ to refer to things, but also for how we know what things are and are not in the world, and the properties that they do and do not have.

A further problem, and a problem that really goes to the core of the realist/empiricist tension that often characterizes attempts at accounting for dispositions, is that there is no way of knowing whether or not a thing possesses a certain disposition when that thing is not exhibiting or manifesting the behavior that we associate with that disposition. Recall the examples given above. The only way for us to know if someone knows how to, or is disposed to, swim is to place the subject in an environment that would bring about swimming behaviors, and see if they do actually swim. In terms of physical dispositions, the only way for me to know if my mug is fragile is to throw it to the ground and see if it breaks. Of course I am disinclined to throw people from boats or to throw mugs from desks in order to subject them to these sorts of tests. As such, simply by looking at them, I cannot know if my office mate knows how to swim, and I cannot know if my mug is fragile. This, in itself, seems reason enough to reject a straightforward behaviorist approach to dispositions. While there is something obviously correct about relating behaviors to dispositions, something is missing[17].

[17] The something that is missing is largely the topic of the following chapters, particularly Chapter 5, which outlines a potential functionalist account of dispositions.

Just as there is arguably no way of telling what disposition someone or something possesses when they, or it, are not manifesting that disposition, nor is there, arguably, a way of telling *what* disposition someone, or something, possesses, even when that person or object *is* exhibiting that disposition. In order to express this point, I will rely upon the now famous Kripkenstein problem (Kripke 1982). In his interpretation of Wittgenstein's rule-following problem, Kripke interprets the following statement by Wittgenstein to be of significance: 'This was our paradox: no course of action could be determined by a rule, because every course of action can be made out to accord with the rule' (Wittgenstein, in Kripke 1982, p.7). The example used by Kripke is that of the addition rule in arithmetic (1982, p.7). Consider the statement, 50 + 40 = 90. The '+' in this statement we generally understand to mean the addition function or the 'plus' rule. In carrying out the calculation, 50 + 40 = 90, I can be judged to have followed the plus rule. Yet following the 'plus' rule is indistinguishable from following any number of other rules, because, to re-use Wittgenstein's expression, 'any course of action can be made out to accord with the rule'. For example, in carrying out the calculation 50 + 40 = 90, suppose I was not in fact following the plus rule at all. Rather, I was following the 'quus rule' (Kripke 1985, p.9). The quus rule states that x quus y, is the same as x plus y, where x and y are both below 51, and if x or y are above 51 then the answer is always 5. The calculation 51 + 40 = 5, would be correct according to the quus rule because it satisfied the requirement of the quus rule that either x or y or both is greater than 51 [18].

[18] While not relevant to my objective treatment of the problem, it should be noted that the Kripkenstein problem is also a subjective problem. That is, even when *I* carry out the calculation 50 + 40 = 90, there is no way for *me* to be sure that the rule that *I* followed was the plus rule and not the quus rule.

The particular issue that I will use the Kripkenstein problem to draw attention to is that regardless of the behavior that a person or object exhibits, we cannot tell which behavior someone, or something, is manifesting, even when they are in fact manifesting it. Suppose I witness someone carrying out the calculation 50 + 40 = 90. Given that this behavior is consistent with both plus and with quus, I cannot tell which of these rules has been followed. As such, I cannot tell whether I have observed the application of quus, or the application of plus. The behavior could be consistent with the application of the plus rule, the quus rule, or a potentially infinite number of other rules that one might imagine.

As it is with the behaviors of people, so it is with the behaviors of objects. Kripke's problem was presented in terms of rule following. In order to present the analogy with physical dispositions, I will speak not in terms of the following of rules but of the undergoing of processes.

The manner of the behavior, or the process by which the behavior occurs, is important. The manifestation of some disposition following the stimulus of that disposition could be considered a process. This seems to be the approach taken by Carnap (1956, p.63). Characterizing a disposition solely in terms of stimulus and manifestation conditions excludes a very important component of the behaviors that are actually occurring, which attention to the manner of manifestation is intended to pick up upon.

Consider an example. Two magicians are performing on stage. Both claim to be able to levitate. Suppose that one is actually able to do so by way of magic and that the other is

a charlatan and merely appears to levitate through clever use of wires and such. Despite both magicians outwardly manifesting the behaviors associated with levitation, only one actually possesses the ability while the other does not. If we do not, or are not able to, pay sufficient attention to the *manner* of the manifestation of these behaviors, we will be misled as to what dispositions are actually manifesting. Both magicians have the outward appearance of rising from the ground. They do so, however, by totally different processes or means. To call both 'levitation' is at best misleading and at worst an ontological error. When sufficient attention is paid to the process by which they exhibit their behaviors, intuitively, they are manifesting different dispositions, even though their behaviors are identical. The point here is twofold. Mere behavior, at least at a more superficial level, is not sufficient to characterize or analyze the dispositional state of some object. But moreover, unless we pay sufficient attention to the manner of the manifestation of some disposition, we cannot *know* which disposition it is, the manifestation of which has been witnessed.

Kripke supposed that after completing a calculation involving the plus rule, a 'bizarre skeptic' might question Kripke's certainty as to his answer (1982, p.8). So it is with physical dispositions. In observing the manifestation of any disposition whatsoever, a bizarre skeptic, or indeed any perfectly sane person, might question the nature of the process by which this manifestation occurred. One does not need to be a 'bizarre skeptic' to question the nature of the processes by which certain behaviors are manifested. Just by observing a superficial behavior, then, we cannot *know* what disposition we have actually observed.

2.6 Summary.

I have argued above that someone who adopts a Pure Dispositions Thesis is committed to something interestingly, though not completely accurately, analogous to a behaviorist approach to the mind. I have also argued that there are a number of problems associated with taking such an approach. This does not mean, however, that someone is not able to adopt either a Pure Dispositions Thesis or perhaps a modified conception of dispositions. Indeed, there seems to be two possible directions one might take in response to this set of problems.

The first of these is to retain the strict empiricist underpinning of the behaviorist approach and assume that the manifested behaviors represent the dispositional properties of the object in question. That is, if we drop a seemingly fragile glass and the manifestation of the fragility behavior is somehow confounded, then the object is clearly not fragile. Indeed, Johnston (1992, p.234) points out that 'because pure dispositions by definition lack a constituting basis there seems little to the idea of a pure disposition being masked, altered or mimicked'. As such, there seems little reason for a behaviorist towards pure dispositions to even find problematic many of the things that I have argued above are problematic. This approach, in defiance of the arguments that I have provided above, retains empirical respectability but at great cost.

The second of these directions is to assume that the manifested behaviors do not *necessarily* represent the dispositional properties of the object in question. That is, if we

drop a seemingly fragile glass and the manifestation of the glass is somehow confounded, then the glass can still be assumed to be fragile, if we know enough about the confounding circumstances and underlying qualities of the glass that *make* it fragile. This attitude is more consistent with the approach that I take in this thesis.

3 Dispositions and Conditionals.

3.1 Introduction.

In this chapter, I more closely examine the relationship between dispositions and conditionals. I argue that Edgington's (1986) argument against certain conditionals capturing our common practices and use of conditional language is particularly applicable to the special case of the apparent conditionality of dispositions. Edgington proposes, as an alternative to truth-functional analyses of conditionals, a 'suppositional' account [19]. I do not intend to establish the claim that Edgington's account provides a semantics for conditionals, or 'if, then' statements, in general. Rather, I intend to argue, primarily in the next chapter, that Edgington's suppositionals *can* account for the apparent conditionality of dispositions, or 'is disposed to' language [20].

Edgington's discussion is primarily concerned with the indicative conditional, which has the same truth functionality as the material conditional. This being the case, I might be reasonably criticized on the grounds that even if Edgington's arguments – and hence my arguments – hold in the case of indicative conditionals, they fall short of addressing the full scope of the Simple Conditional Analysis, as it crucially involves a counterfactual

[19] How Edgington's alternative suppositional account applies to dispositions is the subject of the following chapter.

[20] I thank an examiner of a previous version of this thesis for comments that helped to clarify this point.

conditional [21]. Importantly, my target is not the same as Edgington's, however. Though I will briefly discuss some independent reasons for rejecting both the truth conditional and metaphysically committal nature of the counterfactual conditional, my goal is instead to demonstrate that each of the four assumptions that Edgington argues are made by those who endorse certain types of conditionals, account for the standard problems with conditional analyses of dispositions. That is, problems associated with the apparent conditionality of dispositions may be avoided by rejecting these assumptions in the manner that Edgington recommends while discussing indicative conditionals. Yet to do this is to avoid a counterfactual analysis. Again, I do not attempt to establish the claim that the resulting view, which is developed in the next chapter, is *superior* to extant conditional analyses. Instead, the goal of this thesis is to demonstrate the possibility and plausibility of an account of the apparent conditionality of dispositions without appealing to possible world semantics or other such devices.

In this chapter I will argue that the values of the conditionals that comprise the Simple Conditional Analysis of dispositions are, for those who endorse such an analysis, not independent. This presupposition of interdependence between the elements of the Simple Conditional Analysis is what generates the assumptions discussed by Edgington; and in this chapter applied to dispositions. These assumptions are the source of the apparently

[21] I should point out, however, that Edgington states that while 'the main argument of the paper concerns indicative conditionals… this thesis extends to subjunctive or counterfactual conditionals' (1986, p.5). While counterfactuals are generally thought of as being truth conditional, the standard analysis of their truth conditions introduces the framework of possible world semantics, which Edgington's arguments do not directly address.

problematic nature of the standard counterexamples to conditional analyses of dispositions. If this presupposition of interdependence, and hence the four assumptions that follow from it, are not made, then the counterexamples do not result.

I conclude this chapter with the claim that the assumption of interdependence between a dispositional property and its associated stimulus and manifestation conditions can be maintained while avoiding the standard counterexamples if the nature of that relationship is more consistent with that captured by Edgington's suppositional. Essentially, I am claiming that the relationship between a disposition ascription and its stimulus and manifestation conditions is not analytic, in the sense that true sentences asserting relationships of this kind are not true in virtue of meaning facts. It is this assumption of analyticity that generates the standard counterexamples. If the assumption of analyticity is rejected, the assumption of interdependence can be maintained in a way that avoids the standard counterexamples.

3.2 Dispositions and the Conditional.

A material conditional is *false* just when the antecedent is true and the consequent is false, and true otherwise. This has immediate implications for the analysis of conditional statements in natural language in terms of this connective. The view that the material conditional is involved in common 'if, then' type constructions in natural language and

natural reasoning is highly contentious [22]. Given that ordinary locutions and reasoning often involve dispositional claims, so too is it contentious that analyses of dispositions should involve material or indicative conditionals.

For example, if I want to assess the truth of the conditional "if I look in my pocket, then I will find $1000", presumably I would look in my pocket. If I look and I *do* find $1000, then the conditional is true. If I look and I do *not* find $1000, then the conditional is false. However, given that the material conditional is true whenever the antecedent is false, the conditional statement "if I look in my pocket, then I will find $1000" is *true* if I do not look in my pocket; assuming that it is a material conditional that is being expressed. It is true regardless of whether or not there is in fact $1000 in my pocket, assuming I did not look in my pocket.

Now suppose that I want to assess the truth of conditionals that have a false antecedent. For example, I hold my pen up in the air and I say 'if I had let go of the pen, it would have fallen to the ground'. I do not let go of my pen, so the antecedent is false and yet the conditional seems to be true.

Conditional claims involving dispositions are often of this sort. For example, I might say of the glass upon my desk that if the glass were thrown against the wall, then it would break. I do not throw my mug against the wall, so the antecedent is false, and yet the conditional seems to be true. It is for this reason that counterfactual conditionals, rather

[22] The view that such conditionals capture commonly used 'if, then' locutions is largely the view against which Edgington argues.

than material conditionals, are usually taken to link the stimulus and manifestation conditions of a disposition.

Upon the Lewis-Stalnaker account of counterfactual conditionals, a counterfactual is true just if the consequent is true *at the nearest possible world* in which the antecedent is true (Stalnaker 1968, Lewis 1973). So my statement, "if I had let go of the pen, it would have fallen to the ground" is true, just if at the nearest possible world to the situation of evaluation in which I *do* drop the pen, it falls to the ground.

Dispositions seem to involve *some* sort of conditionality and they are often analyzed in terms of conditionals. The common, so-called, Simple Conditional Analysis of dispositions has the following structure:

Simple Conditional Analysis: $D \leftrightarrow (S \mathrel{\Box\!\!\rightarrow} M)$ [23]

[23] The $\Box\!\!\rightarrow$ symbol represents the counterfactual conditional.

The S $\Box\rightarrow$ M conditional is usually taken to be a counterfactual conditional (Bird 2009, p.24) [24]. Consider fragility as an example. Something is said to be fragile, *iff* if it is struck, it would break [25].

So, the Simple Conditional Analysis contains three separate conditionals, one of which is a counterfactual conditional. The first of these conditionals is the conditional that links the stimulus and manifestation conditions. I will refer to this as the SM conditional. This states that if some stimulus event occurs then the associated manifestation event also occurs:

SM: S $\Box\rightarrow$ M

The second and third conditionals are those that comprise the biconditional. The biconditional ($\leftrightarrow$) asserts that the implication between D and S $\Box\rightarrow$ M, and holds in both

[24] There is a large body of literature surrounding various attempts at analyzing dispositions in terms of conditionals. For an excellent overview on conditional analyses of dispositions, their problems and attempted solutions and reformations, see Bird (2009 pp.18-42).

[25] This is an oversimplification. Strictly speaking the above is better thought of as an analysis of breakability rather than of fragility. Fragility seems to imply a number of other conditions. For example, a fragile object, in order to manifest its fragility, must be struck with sufficient force for it to actually break but that force must not be so great as to break a non-fragile object. *Fragile* objects, as opposed to breakable objects, break when struck with relatively little force.

directions of implication. We say of something fragile that if it is struck, it would break, and we also say that of something that if it is struck, it would break, then it is fragile. That is, a biconditional $p \leftrightarrow q$ is true, just if the conditional $p \rightarrow q$ is true *and* the conditional $q \rightarrow p$ is also true. So, the biconditional in the Simple Conditional Analysis is a conjunction of the conditional $D \rightarrow (S \mathbin{\Box\!\!\rightarrow} M)$ and the conditional $(S \mathbin{\Box\!\!\rightarrow} M) \rightarrow D$.

The first of the conditionals which conjoin as the biconditional of the Simple Conditional Analysis states that if some disposition exists, then it will manifest its associated behavior in response to an appropriate stimulus. Bird (2009, pp.24-25) refers to this conditional as CA→.

CA→: $D \rightarrow (S \mathbin{\Box\!\!\rightarrow} M)$

The second of these conditionals states that if a particular behavior is manifested in response to an appropriate stimulus, then an associated disposition exists. Bird (2009, pp.24-25) refers to this conditional as CA←.

CA←: $(S \mathbin{\Box\!\!\rightarrow} M) \rightarrow D$

So the Simple Conditional Analysis is committed to each of these conditionals holding when the relevant dispositional relationship obtains.

Having outlined each of the conditionals that comprise the Simple Conditional Analysis, I will now go on to provide an overview of some of the major counterexamples to this

analysis. I should note here that sophistications of the Simple Conditional Analysis have been advanced, notably by Lewis (1997). Further counterexamples to these sophistications have since been advanced in response [26]. I will not attempt to discuss the sophistications of the Simple Conditional Analysis or the counterexamples to its sophistications.

3.3 Counterexamples to Conditional Analyses.

These conditional analyses of dispositions are problematic insofar as they face two primary types of counterexamples; confounding counterexamples, and mimicking counterexamples [27].

Choi and Fara (2012) point out that each of these is a special case of what Shope (1978) calls 'The Conditional Fallacy in Contemporary Philosophy'. Shope points out that these

[26] See Choi and Fara 2012; Fara 2005; Choi 2006, 2009; and Bird 1998, for further discussion of and objections to Lewis's Reformed Conditional Analysis.

[27] There have also been numerous attempts at addressing these sorts of problems. Some argue that despite these problems, the Simple Conditional Analysis can be accepted (Choi 2006, 2008, 2009). Others have attempted to reform the Simple Conditional Analysis in order to address these problems (Lewis 1997). Mumford and Anjum (2011, 2012) take a different approach altogether and 'model' dispositions in terms of vectors. Another approach has been to attempt to account for the conditional nature of dispositions but without explicitly using conditionals (Fara 2005).

sorts of problems emerge because the truth of a conditional is dependent upon the truth-value of the antecedent. As such, Shope characterizes the problem as:

> A mistake one makes in analyzing or defining a statement *p* by presenting its truth as dependent, in at least some specified situations, upon the truth (falsity) of a subjunctive conditional Ø of the form: 'If state of affairs *a* were to occur, then state of affairs *b* would occur', when
>
> (Version 1) one has failed to notice that the truth value of *p* sometimes depends on whether *a* actually occurs and does not depend merely upon the truth value of the analysans or definiens; moreover, one has failed to notice this because one has overlooked the fact that in some of the specified situations… if *a* were to occur then the occurrence of *a* or the occurrence of *b* or their combination (the occurrence of *a* or the absence of *b* or their combination) would be at least part of the cause of something that would make *p* true, although *p* is actually false (Shope 1978, p.399).

And/or:

> (Version 2) one has overlooked the fact that, in some of the specified situations, statement *p* is actually true, but, if *a* were to occur, then it would be at least a partial cause of something that would make *b* fail to occur… (Shope 1978, p.400).

Version 1 of Shope's problem expresses a general form of the problems represented by mimicking type scenarios. Version 2 expresses a general form of the problems represented by confounding type scenarios.

Confounding conditions prevent a disposition from manifesting in response to its stimulus, thus rendering false the associated counterfactual conditional S $\Box\rightarrow$M. That is, S will be true but M will be false. As such S $\Box\rightarrow$M will be false in a circumstance in which we are inclined to judge that D holds. Because S $\Box\rightarrow$M is false D $\rightarrow$ (S $\Box\rightarrow$M) is also false. As such, a confounder renders false the Simple Conditional Analysis.

Suppose, for example, I have a glass that I consider to be fragile and I knock it from my desk. We might say that this glass is fragile if and only if, if I knock it from my desk, it will break when it hits the floor. However, if the glass is wrapped in a bubble wrap, or my carpet is especially thick and soft, the glass will not break even though it is dropped. So the conditional is false but many of us are motivated to say that the glass is nonetheless fragile. Hence, the Simple Conditional Analysis appears incorrect.

A special type of confounder is the fink [28]. Notice that in the example that I provided above, an extra condition, the protective nature of the bubble wrap or the softness of the carpet, confounded the manifestation of the disposition. In the case of a fink, the confounding condition is *also* the stimulus condition. For example, consider a live wire.

[28] Martin (1994, p.2) originally referred to his example as an '*electro-fink*'. The term 'fink' has since come to be used to describe more general examples of similar problems.

Given a conditional analysis of what it is for a wire to be live, it might be held that 'if the wire is touched by a conductor then electrical current flows from the wire to the conductor' (Martin 1994, p.2). However, Martin has us consider the following:

> The wire… is connected to a machine…. which can provide itself with reliable information as to exactly when a wire connected to it is touched by a conductor. When such contact occurs, the [reverse] electro-fink reacts (instantaneously, we are supposing) by making the wire [dead] for the duration of the contact. In the absence of contact the wire is [live]. For example, at t^1 the wire is untouched by any conductor, at t^2 a conductor touches it, at t^3 it is untouched again. The wire is [live] at t^1, [dead] at t^2, and [live] again at t^3 (Martin 1994, pp. 2-3).[29]

We say that the wire is live at t^1, but due to the mechanism, it is false that if the wire is touched by a conductor, then electrical current flows from the wire to the conductor. Once again CA→, and hence the simple conditional analysis, is false.

To be clear, in the case of Martin's electro-fink, the confounding condition was, as it was in the more general case of fragility, still an 'outside' condition. Martin explicitly states

[29] Martin's electro-fink was actually the reverse of what has been presented here. The electro fink made an otherwise dead wire live when touched. What has been presented here is what Martin referred to as an electro-fink on a 'reverse cycle' (1994, p.3). I have used his presentation of the electro-fink with 'live' and 'dead' mutually substituted because his description of the electro-fink was clearer, more explicit and more elegant than that of the reverse cycle electro-fink.

that the wire is connected to a machine. There was still something else; the machine, acting to prevent the manifestation following the stimulus. The important distinction is that in the case of the fink, this outside confounding condition exists *only* when the disposition is stimulated. This is clearly not the case with the softness of the carpet or the protective nature of the bubble wrap.

Mimics are, in a sense, the opposite of confounders (Johnston 1992, p.232). While confounders prevent a disposition from manifesting in response to a stimulus, thus rendering false the associated counterfactual conditional S $\Box\rightarrow$M in a situation in which we might intuit that a disposition exists or in which a disposition does in fact exist, mimics bring about a manifestation of apparently dispositional behavior, thus rendering true the counterfactual conditional S $\Box\rightarrow$M in a situation in which we might intuit that a disposition does *not* exist or in which a disposition does not in fact exist. For example, suppose I have a very durable plastic glass on my desk. It is not in any sense fragile. Typically, this durable glass will not break when dropped or struck. But also suppose that it has a powerful explosive attached to it that will detonate when the glass is either struck or dropped. When I knock this glass from my desk, the explosive detonates and the glass breaks (Bird 2009, p.29). So, for this glass, even though it is very durable, it is *true* that when it is dropped, it breaks. The S $\Box\rightarrow$M counterfactual conditional is thus rendered true and as such this durable glass is, according to the analysis, fragile, even though it is in fact durable.

Confounders and mimics are both problematic as they represent an inconsistency between intuition and the Simple Conditional Analysis. A general claim of this thesis is that

conditional analyses of dispositions fail because they attempt to render *analytically* a relationship that is *synthetic*.[30]

A confounding situation is essentially one in which:

SM = F so that CA→ implies that D = F, when the intuitive result is that D = T

A mimicking situation is essentially one in which:

SM = T so that CA← implies that D = T, when the intuitive result is that D = F

In both confounding and mimicking cases, the situation is simply one in which the truth value of CA← is contrary to intuition.

The presupposition that motivates the view that these sorts of scenarios are problematic is that there is what Edgington refers to as a 'stronger than truth-functional "connection" between antecedent and consequent' (1986, p.3) [31]. I take this to mean something like a connection between antecedent and consequent that somehow goes beyond the mere truth function of the material conditional. I will argue below that the basis of this presupposed

[30] In the following chapter I attempt to preserve the apparent conditionality of dispositions which retains the synthetic relationship between antecedent and consequent. In this chapter I attempt to explicate the nature of the problem.

[31] For the lack of anything better, I will continue to use Edgington's terminology where appropriate.

connection is the existence or otherwise of some sort of causal basis for the disposition in question.

The truth function of the material conditional states that the conditional is false whenever the antecedent is true and the consequent is false, and is true otherwise. Those who believe in a stronger than truth-functional connection between antecedent and consequent deny this claim and believe that:

> (Confounders) there are situations in which the SM conditional might be true when the truth-values of the antecedent and consequent would render the conditional false.

And:

> (Mimics) there are situations in which the SM conditional might be false when the truth-values of the antecedent and consequent would render the conditional true.

Someone who adopts the view that there is no such 'stronger than truth functional' connection between antecedent and consequent will most likely not see mimicking and confounding type scenarios as being at all problematic. Recall, as I stated in chapter 2, Johnston (1992, p.234) points out that 'because bare dispositions by definition lack a constituting basis there seems little to the idea of a bare disposition being masked, altered or mimicked'. That is, because a bare disposition can be understood as lacking some sort

of ground or base upon which the disposition supervenes, and that could serve as a stronger than truth functional connection between stimulus and manifestation, there is no reason for someone who adopts such an view of dispositions to regard these scenarios as being problematic [32].

In the case of dispositions, then, the basis of our intuitive appeal as a connection between antecedent and consequent is some sort of base upon which the disposition supervenes. It may seem strange for me to state that a property can act as a connection between an antecedent and a consequent of a conditional. One is a *physical* thing in the world while the other is a *logical* connection. My claim is that it is the *belief* in the existence or otherwise of the property that motivates one to believe, or not, in the conditional. This is part of my reason for following Edgington's practice, below, of writing in terms of certainty rather than truth.

For example, suppose I knock a seemingly fragile glass from my desk and the glass does not break. There are two ways in which this scenario might be viewed. Someone who denies the existence of a strong connection between antecedent and consequent, or between stimulus and manifestation, will most likely view this glass as being straightforwardly not fragile. Others, who accept the view that there is some sort of strong connection between the stimulus and manifestation, will likely think that the glass *should*

[32] Someone who adopts a Bare Dispositions Thesis may, however, adopt the view that a stronger than truth functional connection exists in the form of a counterfactual conditional.

have broken or perhaps that it *would* have broken were its breaking not confounded. The reason that they might give for the claim that the glass *would* have broken were it not confounded is that the fragility behaviors of the glass supervene upon some further property of the glass that *makes* it the case that it breaks upon being dropped.

The belief in the existence of this grounding property might motivate these sorts of counterfactual claims concerning manifestations following stimuli. Edgington (1986, p.3) points out that these 'stronger-than-truth-functional' "connection[s]"… 'may or may not be framed in terms of a relation between possible worlds'. As I noted above, this relationship that may or may not hold between possible worlds, when assessing the truth-values of the antecedent and consequent in a counterfactual claim, is usually framed in terms of a closeness, similarity or accessibility, relationship (Lewis 1973, pp.8-20) [33]. That is, when assessing whether or not the glass *would* have broken, or would break, upon being dropped, we are assessing whether or not in the nearest possible world in which it is dropped, it breaks. The nearest possible worlds will presumably be those worlds in which the glass shares the same grounding property as the glass in this world [34]. So, the view that confounding and mimicking type scenarios are genuinely problematic, seems to presuppose a belief in a strong connection between the stimulus and manifestation

[33] Notions of similarity are discussed in Chapter 6.

[34] At this point I feel I should remind a reader that this thesis is largely motivated by a desire to account for the apparent conditionality of dispositions without adopting the sorts of metaphysical commitments that a certain type of empiricist might find unattractive. Such things as possible worlds are among these metaphysical commitments.

conditions, and that this connection is due to the existence, or the belief thereof, of a more basic property upon which the disposition supervenes.

In what follows, I will draw upon Edgington's (1986) work on suppositionals, in order to argue that both material and stronger-than-truth-functional counterfactual conditionals can be rejected in an analysis of dispositions. In the next chapter I will expand upon this negative claim and present the positive claim that a recast version of the Simple Conditional Analysis of dispositions, as well as its sophistications, can instead be framed in terms of suppositionals, and that the resulting account retains the resources needed to explain our inclination to associate disposition ascriptions and conditional claims.

The argument that I will be presenting is mostly based upon Edgington's (1986) negative argument against stronger-than-truth-functional conditionals but it will be necessary to have some understanding of her positive thesis in order to see how the stronger-than-truth-functional conditionals are incompatible with her positive thesis.

It is important to note that my target is quite different from Edgington's. Edgington's target is specifically indicative conditionals. My target is *generally* any conditional which involves the adoption of the four assumptions which Edgington discusses. I argue that those who endorse the Simple Conditional Analysis, *and are troubled by its counterexamples,* presuppose the basis of these assumptions.

Edgington's positive claim is that 'The linguistic mental act of *supposing* is ineliminable from conditionals, and they cannot be reduced to straight assertions or beliefs' (1986,

p.28). As such, "to assert or believe 'if A, B' is to assert B within the scope of the supposition or assumption, that A" (Edgington 1986, p.5). So, in considering a conditional, if A, B, we ignore the possibility that not A and consider how likely it is that B, given A. We will believe the conditional, claims Edgington, 'if A, B' when we judge A and B to be nearly as likely as A, or, when we believe A and B to be *more* likely than A and *not* B.

Edgington discusses four assumptions, at least some of which must be made by those who adopt stronger-than-truth-functional counterfactual conditionals. I will present each of these in turn and will demonstrate their applicability to the apparent conditionality of dispositions.

Making these assumptions is what renders the counterexamples troubling to those who endorse the types of conditional analyses which are subject to these counterexamples. If these assumptions are not made, the counterexamples are not troubling; they are simply counterexamples. The problem is generated by a *combination* of these assumptions along with the belief or intuition that a conditional analysis captures the apparent conditionality of dispositions. If one rejects these assumptions, the counterexamples do not follow. If one rejects the belief that conditional analyses that are subject to these counterexamples are correct, the counterexamples are not troubling.

3.4 Mimics.

Assumption 1: truth functionality fails when "A" and "B" are both true (Edgington 1986, p.22).

Edgington (1986, pp.21-24) argues that assumption 1 is to be rejected because it conflicts with both her positive thesis and with common sense. In the case of dispositions, as I will argue in the following chapters, our common sense, or folk understanding of dispositions is important to generating a suitable account [35]. Moreover, assumption 1 is incompatible with the positive thesis. Assumption 1 entails that each of the rows in the below table represent open possibilities:

A	B	If A, B
T	T	T
T	T	F

Under these conditions, we are certain that A and we are certain that B and yet we remain uncertain as to whether or not 'if A, B'[36].

[35] In much the same way that Jackson (1998, p.118) holds that 'we had better… identify our subject via the folk theory of…' in this case, dispositions.

[36] It may be noted that I have moved from 'truth' to 'certainty'. This is for two main reasons. The first is simply that my argument here draws heavily upon Edgington's and that she speaks in such terms. The second is that a part of my overall thesis is to move towards an epistemic account of the conditionality of dispositions. I argue below that

Upon the positive thesis, however, if we are certain that A and we are certain that B, we are certain that B, *on the assumption that* A. Because we are certain that B on the assumption that A, we are certain that if A, B. In other words, there is no better way to be certain of the truth of a conditional than when both the antecedent and consequent are both true. Because assumption 1 conflicts with the positive thesis, and according to Edgington, with common sense, assumption 1 is put in question [37].

Assumption 1 seems to be the intuition that generates mimicking type problems with conditional analyses. To express this in terms of dispositions, we may be certain that a stimulus occurs, and also certain that the associated manifestation follows, and yet we may remain uncertain as to whether or not the SM conditional is true.

Consider some examples. First, consider an example that corresponds to line 1. Suppose there is a bowl upon my desk and that the bowl is of unknown constitution and disposition; I have no particular belief concerning whether it is fragile or otherwise. I

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reliance upon *truth* functionality and *truth* conditionality is what generates many of the problems associated with conditional analyses of dispositions.

[37] Again, Edgington's arguments are concerned with indicatives and not with counterfactuals, although she does state that she believes her account can be extended to counterfactuals (1986, p.5). I am not targeting indicatives *or* counterfactuals. Instead, I am demonstrating that the assumptions discussed by Edgington are applicable to the apparent conditionality of dispositions.

strike it and it breaks. Upon this example, I am certain of A and certain of B and I seem inclined to be believe that if A, B. So far, this seems fine.

Now consider an example that corresponds to line 2. Suppose that I strike that bowl and that it breaks, but according to line 2, I believe it to be false that if A, B. Upon this example, I am certain of A and certain of B and yet I seem disinclined to believe that if A, B. This, however, seems wrong.

The above examples, that correspond to lines 1 and 2, do not seem consistent with assumption 1; the assumption that both of those lines are genuine possibilities. I will now argue that the reason for this is that presupposed by beliefs concerning the value of the SM conditional, is a belief concerning the value of D; its antecedent in the CA→ conditional. Our belief in the value of D, that is the belief in whether or not a particular dispositional property is or is not possessed by the object in question, fixes our belief in the SM conditional.

To illustrate this point, consider some modifications of the above examples. First, consider an example that corresponds to line 1. Suppose there is a genuinely fragile crystal bowl upon my desk. I strike it and it breaks. Upon this example, I am certain of A and certain of B and I seem inclined to be certain that if A, B. As above, this seems fine. The difference here is that it is not the values of A and of B that determine our belief in 'if A, B', but rather our belief that the bowl is fragile.

But what of line 2? This example is due to Lewis (1997, p.153) who attributes its origin to Daniel Nolan. Suppose there is a Styrofoam bowl on my desk and my officemate, who is a passionate hater of Styrofoam is present. I strike the Styrofoam bowl, at which point my officemate, who hates the sound of Styrofoam being struck, walks over and destroys the bowl. In this example, I am certain that A and I am certain that B and yet I seem disinclined to believe 'if A, B'. That is, I am certain that the bowl was struck and I am certain that the bowl broke but I seem disinclined to believe that the Styrofoam bowl, to which I would not intuitively attribute fragility, is disposed to break upon being struck.

There are two connected issues here. The first is that belief or intuition concerning the existence or otherwise of a strong connection between antecedent and consequent is what determines belief or otherwise in the conditional. That is, the truth values of the antecedent and consequent seem not to be relevant to our endorsement of the conditional. Hence the claim that truth functionality fails when A and B are both true.

The second issue is a continuation of the first. The second issue is whether or not 'if A, B' entails the possession of the associated disposition by the object in question. According to the Simple Conditional Analysis, it does, but for reasons such as those provided by Lewis's Styrofoam bowl example, this does not seem to be the case. The associated disposition *is* the connection that exists between antecedent and consequent. If someone has the belief that the associated disposition is possessed by the object in question, they will be inclined to believe 'if A, B' with respect to that object. If someone does not believe that the associated disposition is possessed by that object, they will not be inclined to believe 'if A, B' with respect to that object. This accounts for the result of Lewis's

example. In the absence of a belief in the instantiation of fragility in the Styrofoam bowl, one will be disinclined to believe that if the bowl is struck, it will break. My overall point here, and a large part of the overall point of this chapter, is that it is the *belief* in the existence or otherwise of the associated dispositional property that determines belief in the SM conditional, and *not* the truth values of its antecedent and consequent. That is, we can account for our acceptance of conditional claims about dispositions in terms of our background beliefs concerning the existence or otherwise of a dispositional property, rather than in terms of the truth values of the antecedent and consequent of the SM conditional.

These examples illustrate what it is for a strong connection to hold between antecedent and consequent. In the first example such a link was intuitively present, while in the second example, it was absent. In both of these examples, this strong link between A and B seems to be a background assumption that is informing the degree of confidence in the conditional "if A, B". We tend to believe that crystal is fragile and so we tend to have a high degree of confidence in the associated conditional. Likewise, we tend not to believe that Styrofoam is fragile and so we tend to have a correspondingly low degree of confidence in the associated conditional.

This is why mimics are a *problem* for conditional analyses such as the Simple Conditional Analysis. Mimics imply that such a connection exists, while intuition, or perhaps even in-depth knowledge of the object in question, tells us otherwise.

Some may object that in the case of the Styrofoam bowl, they would happily endorse the conditional 'if It is struck, it will break' [38]. I share this view but deny that this is a problem. Presumably, the reason given for the endorsement of this conditional will be the knowledge, or belief, that the hater of Styrofoam will intervene to break the bowl upon its being struck. Notice, however, that this is just to appeal to a *different* sort of link between antecedent and consequent. Belief in the fragility of a crystal bowl might motivate one to endorse the claim 'if it is struck, it will break'. Likewise, belief in the presence of the hater of Styrofoam might motivate one to endorse the claim "if it is struck, it will break' in the case of the Styrofoam bowl. The difference here is that the strong link is in one case belief concerning an intrinsic dispositional property of bowl, while in the other case, it is not.

What about a more ambiguous case? Suppose there is on my desk an object that looks like a fragile glass but I cannot be certain as to whether it is made from fragile crystal, durable plastic or something else altogether. It is struck and it breaks but I am uncertain as to the truth-value of the conditional. If the glass is like the crystal bowl then I might consider the conditional true; if it is like the Styrofoam bowl, then I might consider it to be false. In this case, lacking the belief that I had in those cases concerning the disposition of the bowl, I remain uncertain concerning the conditional. So, I am certain that A, and I am certain that B, and yet I remain uncertain that if A, B. It is my absence of a belief concerning the dispositional property possessed by the glass that seems to generate assumption 1.

[38] This would be consistent with a sort of view presented in the previous chapter.

Supplementing it by reference to these beliefs concerning the dispositions of the object in question, the above table comes to this, then:

A	B	Belief concerning D	If A, B
T	T	T	T
T	T	F	F
T	T	Uncertain	Uncertain

Notice that the truth, or belief-value of the conditional, here, seems to be entirely determined by the value of the belief in the dispositions possessed by the object in question.

So, the content of our beliefs concerning other properties, whether intrinsic, in the case of dispositions, or extrinsic, in the case of the hater of Styrofoam, possessed by the object in question almost entirely determines our belief in the obtaining of the conditional. That is, the value of the SM conditional, and of D, are not independent. This assumption of interdependence between SM and D is what generates each of the 4 assumptions discussed by Edgington. As Edgington argues, assumption 1 is incompatible with both her positive thesis and with common sense. Moreover, assumption 1 is the assumption that generates the mimicking counterexamples. If assumption 1 is not made, no mimicking counterexamples will be possible. As such, assumption 1 is to be rejected in

the special case of dispositions. I make no claim as to whether or not assumption 1 is to be rejected generally.

3.5 Confounders.

Assumption 2: truth functionality fails when "A" is true and "B" is false (Edgington 1986, p.24).

According to Edgington, assumption 2 is also incompatible with both the positive thesis and with common sense. Adopting assumption 2 entails that each of the rows in the below table represent open possibilities:

A	B	If A, B
T	F	T
T	F	F

Under these conditions, we are certain that A is true and certain that B is false, and we remain uncertain as to whether or not the conditional "if A, B" is true. This, however, conflicts with the standard counterexample to the material conditional; when A is true,

and B is false [39]. It is fairly intuitive that a truth-conditional conditional is false whenever the antecedent is true and the consequent false. Indeed, for the material conditional, these are the *only* conditions under which a conditional is false. Edgington's positive thesis makes a similar judgement. If someone knows that A is true and that B is false, then they can be certain that B is false on the assumption that A. As such, they are certain that "if A, B", is false. The uncertainty of assumption 2 conflicts with both the certainty of the positive thesis, and with intuition. As such, assumption 2 is put in doubt.

Assumption 2 seems to be the intuition behind confounding type problems and other issues that involve the prevention of the manifestation of a disposition in response to the associated stimulus. To express this in terms of dispositions, we may be certain that a stimulus occurs, and certain that the associated manifestation did not follow, and yet we may remain uncertain as to whether or not the SM conditional is true.

Consider some examples. First, consider an example that corresponds to line 2. Suppose there is a bowl upon my desk and that the bowl is of unknown constitution and disposition; I have no particular belief concerning whether it is fragile or otherwise. I strike it and it does not break. Upon this example, I am certain of A and certain that *not* B and so I seem disinclined to believe that if A, B. So far, this seems correct.

[39] Again, I am aware that the SM conditional is a counterfactual conditional and not a material conditional. This discussion concerns the assumptions, or informal reasoning, surrounding these conditionals, and not the logic of these conditionals.

Now consider an example that corresponds to line 1. Suppose that I strike that bowl and that it does not break, but according to line 1, I believe it true that if A, B. Upon this example, I am certain that A and certain that *not* B and yet I seem inclined to believe that if A, B. This, however, seems wrong. This is the confounding problem.

As I did with the mimicking case, I will now argue that the reason for this is that presupposed by beliefs concerning the obtaining of the SM conditional is a belief concerning the obtaining of D; its antecedent in the CA→ conditional. Our belief in the value of D, that is the belief in whether or not a particular dispositional property is or is not possessed by the object in question, fixes our belief in the value of the SM conditional.

To illustrate this point with respect to assumption 2, consider some modifications of the above examples that correspond to the table below.

S	M	Belief concerning D	If S, M
T	F	T	T
T	F	F	F

Consider an appropriately modified example of line 2. Suppose there is what I take to be a genuinely fragile crystal bowl upon my desk. I strike it and for whatever reason, it does not break. I am certain that A and certain that not B and yet I seem inclined to believe that 'if A, B'. This is contrary to the result that was reached without any belief concerning the disposition of the bowl. With the extra belief concerning the disposition possessed by

the bowl in play, it now seems wrong to believe the conditional to obtain. That is, I am certain that the bowl was struck, and I am certain that the bowl did *not* break, yet I seem disinclined to believe that the crystal bowl to which I have attributed fragility, is disposed to break upon being struck. There is a conflict here between my belief that the bowl is fragile, and my disinclination to believe 'if A, B'. Again, my preparedness to accept 'if A, B' is determined by something other than the values of A and of B.

Now consider the more important example that corresponds to line 1. Suppose there is what I take to be a genuinely fragile crystal bowl upon my desk. I strike it and for whatever reason it does not break. Upon this example, I am certain that A and certain that not B. As a result, I am certain that 'if A, B' is false with respect to the fragile bowl. But in the case of dispositions this *seems* wrong to many. *Surely if the bowl is genuinely fragile then the SM conditional will be true*. This is the very intuition that generates confounding counterexamples, or more specifically the belief that such counterexamples ought to be considered problematic. Again, counterexamples are only problematic if one *wants* to *save* the analysis. Otherwise, a counterexample is just a helpful indication that we are in error.

Recall that a confounder, or fink, is a situation in which a disposition ascription is intuitively true, but the associated SM counterfactual conditional is false. This can only be regarded as a potential counterexample if one takes the view that the value of D determines, or is determined by, the value of the SM conditional.

Again, the point I am trying to make here is that the values of the SM conditional and of D (and hence the CA← and CA→ conditionals) are, for those who find the counterexamples problematic, not independent. This assumption of interdependence between SM and D is what generates assumption 2, and each of the other 3 assumptions discussed by Edgington, and is the source of the apparently problematic nature of the counterexamples. If this assumption of interdependence, and hence the 4 assumptions that follow from it, are not made, then the counterexamples do not constitute genuine problems.

3.6 Spontaneous manifestation.

Assumption 3: truth functionality fails when "A" is false and "B" is true (Edgington 1986, p.25).

According to Edgington, assumption 3 is incompatible with both the positive account and with common sense. The following possibilities are then open upon assumption 3:

A	B	IF A, B
F	T	T
F	T	F

Given these possibilities, we can be certain that A is false and certain that B is true and yet remain uncertain as to whether if A, B. But how could this be? This is a clear example of the operation of conditionals that possess a link between antecedent and consequent that is stronger than truth functionality. Under what conditions might we say that 'if A, B' is true when A is false? According to something like the Lewis-Stalnaker account of counterfactuals, 'if A, B' will be true just if B is true at the nearest possible world in which A is true (Lewis 1973, pp.8-10). However, we cannot be certain as to whether or not this is indeed the case. We do not have sufficient epistemic access to possible worlds to be *certain* of such things in the case of dispositions [40]. As such we know that A is false and we know that B is true and yet we do not know whether or not if A, B.

This, however, conflicts with both the positive account and, according to Edgington, common sense. Upon Edgington's positive account, because we are certain that B, we can also be certain that B on the assumption that A. As such if we are certain of B, we are also certain that "if A, B". For example, suppose I know for certain that the grass outside is wet. With this certainty, I can also know that if it recently rained, the grass outside is wet. Likewise, if I know that the grass outside is wet, I can know that if it has not rained for a month, or if my neighbor has a pet unicorn, or indeed anything else at all, the grass outside is wet. So, the positive thesis states that if we are certain that B then we can be certain that if A, B, while assumption 3 holds that while we may be certain that B, we

[40] Here I am simply expressing my empirically motivated suspicion of counterfactuals. I do not expect a reader to share this suspicion, but make this comment to remind a reader of one of the primary general motivations for this thesis.

cannot be certain that if A, B. As such, assumption 3 is incompatible with the positive thesis, and according to Edgington, common sense, and should be rejected.

Within the literature on dispositions, this seems to be the intuition that generates issues concerning something like spontaneous manifestation of some apparently dispositional behavior (Lowe 2011, p.22). Such cases have not been covered in great detail in the literature, probably because they do not seem to constitute a counterexample to conditional analyses and so appear not to be theoretically critical. This is due to the fact that conditional analyses stipulate that a stimulus must be somehow involved in the manifestation of dispositional behaviors. I am not convinced that dispositions require stimuli. The stipulation by conditional analyses that observable stimuli are required is, I think, a weakness of such analyses [41].

An example of this might be something like a fragile glass that shatters even though it is not struck, dropped, or otherwise stimulated. This is a similar issue to a mimic but differs in that in the case of a mimic, we do not intuit that a disposition is present while in this case, we might intuit that a disposition exists, even though that disposition has no apparent stimulus, or perhaps no stimulus at all; apparent or otherwise. Mimics still involve a

[41] I mention the observability of stimuli here in order to address the possibility of something like an unobservable, indeterministic quantum stimulus. Such a thing could, at least conceivably, act as a stimulus even though it may be unobservable and difficult to capture in a conditional analysis.

stimulus event, even though the apparent stimulus does not *legitimately* bring about the manifestation.

While I do not address the issue here, assumption 3 does seem to be of some relevance to certain indeterministic events that might be interpreted as being dispositional. We might say, for example, that a certain atom has a certain chance to, or perhaps disposition to, decay within a particular period of time. Should that atom decay at some time, it seems to have manifested a sort of dispositionality even though there was no apparent stimulus (Lowe 2011, p.22) [42].

These fundamental properties do indeed seem to involve some sort of behavior that does not seem to require a stimulus in order to manifest. We might say of positive charge that part of what it means for something to be positively charged is that it repels other positively charged things, and that an electron possesses this disposition. We might then imagine a scenario in which an electron is somehow separated from anything with which it could interact in order to manifest its charge. That is, there is nothing for this electron to repel and yet we might *still* want to say of this electron that it possesses that charge. Its charge is constantly, perhaps necessarily, manifesting even though there is no way to observe this manifestation.

[42] If there is such a thing as a 'bare disposition', I think something along these lines is an excellent candidate for its possession. Indeed, some have argued that certain fundamental physical properties such as mass, charge, and spin are irreducibly dispositional. See Lange (2002) for an introduction to the dispositional nature of such things as mass and fields. I suggest that such properties may fall into this category.

Edgington provides a nice example of how assumption 3 might be applied, that I will re-appropriate and translate into dispositional terms. Suppose we place a glass on the table and leave the room. When we return, we notice that the glass is broken. So, we are certain that the glass is broken. We were not present for the breaking event, however, and so we cannot be certain whether or not it was struck. We look at the dog, who stares at us innocently as if to say 'I did not break the glass' but we are unsure as to whether or not to believe him. In adopting assumption 3, we should reason as follows: The glass is broken. Suppose that the dog knocked the glass, then the conditional 'if the dog struck the glass, it broke' is true. But suppose he did in fact not knock it, this, together with the fact that the glass is broken, is not sufficient for the truth of the conditional. The truth of the conditional under these circumstances would depend on whether or not in the nearest world in which the dog knocked the glass, it broke, and we cannot be certain of that one way or the other. Because we cannot be certain of that one way or the other, the truth of the conditional 'if the dog struck the glass, it broke' is uncertain [43].

Upon this example, as it is with assumption 1, there is something in addition to the truth-values of A and B that influences the truth-value of 'if A, B'. This 'something' is, upon the Lewis-Stalnaker account, the value of B in the nearest world in which A (Stalnaker

[43] Inferential reasoning of this type concerning dispositions is largely the subject of the following chapter. It is my claim that such reasoning better captures our understanding of dispositions and accounts for the apparent conditionality of dispositions, while making fewer metaphysical commitments and avoiding the standard counterexamples.

1968, Lewis 1973). When this is incorporated into the table above, something like this is generated:

A	B	Possible world	IF A, B
T	T	T	T
F	T	T	T
F	T	F	F

Notice that the truth-value of the conditional matches the value of the possible world column. That is, whatever the value of B in the nearest possible world in which A, the value of the conditional will match. So, according to assumption 3, the *actual* truth-value of A and B are not sufficient for the truth-value of the conditional. According to Edgington's positive thesis, however, this is not the case. For example, suppose we are certain that B and uncertain that A. On the positive account, because we are certain that B, we are certain that *on the assumption that* A, B. But according to assumption 3, we can be certain that B and yet remain uncertain that if A, B. As such, assumption 3 is put in question.

Following my previous examples concerning assumptions 1 and 2, the 'possible world' column might be replaced with a 'belief in D' column. The same result will follow. Again, the point here is that belief in the possession or otherwise of some dispositional property is ultimately what determines the value of the SM conditional.

3.7 Unmanifested dispositions.

'Assumption 4: Truth functionality fails when "A" and "B" are both false' (Edgington 1986, p.26).

According to Edgington, assumption 4 is mistaken for similar reasons to assumption 3. She provides the following argument. Suppose we are certain that John and Mary were together yesterday evening but we are uncertain as to whether they attended a party. Given that we are certain that they were together, we can be certain of the conditional claim that 'if John went, Mary went'. But given assumption 4, there are three open possibilities:

John went	Mary went	If John went, Mary went
T	T	T
F	F	T
F	F	F

The important possibilities to consider here are possibilities 2 and 3. Upon both of these possibilities, neither John nor Mary went to the party but importantly, whether or not the conditional 'if John went, Mary went' is true, is an open possibility. This, however, contradicts our certainty in 'if John went, Mary went'. As such, assumption 4 is to be rejected, claims Edgington.

Assumption 4 seems to be the intuition that allows us to make dispositional ascriptions even when the disposition is never stimulated nor manifested. Recall that the situation is one in which A and B are both false and yet we are uncertain as to the associated conditional 'if A, B'. In dispositional terms, we might say that we are certain that the glass was neither dropped nor struck, nor was it broken, and yet we remain uncertain as to whether the conditional 'if the glass was dropped, it would be broken' is true. This is the perfectly familiar situation we often find ourselves in when making dispositional ascriptions to common objects. I look at the perfectly intact glass on the desk, I see that it is not struck and I see that it is not broken and yet I think it will break if I throw it at the wall; but I can't be sure.

Consider a dispositional example of this but in the terms that Edgington provided. Suppose there is a glass hidden behind an opaque screen and suppose I am told that the glass was either both struck and broken, or was not struck and not broken. That is, A and B have the same truth-value but I do not know which it is. Again, the following possibilities obtain:

Glass was struck	Glass broke	If struck, broke
T	T	T
F	F	F
F	F	T

Because A and B have the same truth value, the possibilities on lines 1 and 2 are genuine, live possibilities. But, according to assumption 4, so is line 3. However, given that I know that A and B have the same truth value, I know that if the glass was struck, it broke, *and* I know that if the glass was *not* struck, it did *not* break. Possibility 3 is not a genuine possibility. This contradicts our general intuition that we can make disposition ascriptions to objects that have been neither stimulated nor manifested.

3.8 Summary.

This chapter has discussed the relationship between dispositions, conditionals, and the attempt to analyze dispositions in terms of conditionals. The standard counterexamples to the Simple Conditional Analysis of dispositions have been outlined. I have applied Edgington's (1986) argument against conditionals that she has called 'stronger than truth functional' to demonstrate that the assumptions made by those who endorse such conditionals are largely responsible for the standard counterexamples to conditional analyses of dispositions; chiefly, the Simple Conditional Analysis.

The primary claim that I have attempted to make is this: the value of the SM conditional is not independent of belief in D. Analyses state D and the SM conditional have the same semantic content, or same truth values, but the standard counterexamples show that this is not the case. That is, whenever one holds a belief concerning the possession or otherwise of some disposition by some object, one's belief in the SM conditional will be determined largely by the prior belief in the possession or otherwise of said dispositional

property. The standard counterexamples are essentially counterexamples to this intuitive interdependence.

This presents two immediate options. First, one may accept that the counterexamples are in fact genuine and deny that there is any dependence between the possession of a dispositional property and associated stimulus and manifestation conditions. This option is to essentially deny the existence of dispositions. Second, one may retain the belief that there exists some sort of dependence between a dispositional property and its associated stimulus and manifestation conditions, but alter the nature of that relationship. This second option is the one that I pursue in this thesis.

If one wishes to retain the intuition that there is indeed an interdependence between the SM conditional, or its constituents, and the possession or otherwise of a disposition by some object, I suggest that an appropriate strategy is to hold that the nature of that interdependence is something weaker than truth.

In the following chapter I apply Edgington's positive account of suppositionals to demonstrate that one can retain the assumption of interdependence between SM and D, while weakening the nature of that interdependence from truth to a sort of epistemic relationship that is more consistent with both folk and scientific reasoning concerning dispositions.

I will show *why* it is the case that SM and D are not independent and will provide an account (which I am hesitant to call an 'analysis' because I do not believe that it is

analytic) of the apparent conditionality of dispositions that allows for the dependence between SM and D while simultaneously accounting for our common use of dispositional concepts and avoiding the standard counterexamples. This comes at the cost of analyticity and of truth. Instead, my account captures the *pragmatic* content of dispositional concepts and ascriptions in manner that is consistent with their common use and use in science. While I do not wish to argue generally for a pragmatic approach to science, my account is consistent with such an approach.

4 A Suppositional Account of Dispositions.

4.1 Introduction.

Despite my previous arguments against truth conditional, truth functional, and stronger than truth functional conditionals being used in analyses of dispositions, it does seem to be the case that dispositions are closely related in *some* way to conditional statements. If someone were to ask me about some disposition, such as fragility, I might respond by talking about the way in which fragile things break when struck. Indeed, I might say that something is fragile just if it breaks when struck.

There are 3 conditionals that are included in the Simple Conditional Analysis, relating the three distinct atomic elements of the analysis. I believe that these elements are roughly the correct elements, and that the arrangement of the relationships between these elements is roughly correct. However, the nature of the relationships between them has, I think, been represented in such a way as to make the Simple Conditional Analysis both false, and too metaphysically laden.

As discussed in the previous chapter, these three conditionals are:

SM: $S \ \Box\!\!\rightarrow M$

CA→: $D \rightarrow (S \ \Box\!\!\rightarrow M)$

CA←: $(S \ \Box\!\!\rightarrow M) \rightarrow D$

In what follows I will examine each of these three conditionals in turn. I will argue that the two conditionals which are generally packaged as a biconditional within the Simple Conditional Analysis are best understood as different types of conditional, expressing different types of conditional inference. That is, CA→ expresses a different type of inference to CA←. If so, it is difficult to treat the two as a biconditional (and to then look for an appropriate form of conditional to sustain this connection).

I will argue that the three conditionals in the Simple Conditional Analysis are best understood as suppositionals, rather than as truth functional material conditionals, or stronger than truth functional counterfactual conditionals. The resulting view has three attractive features:

(i) Counterfactual conditionals raise metaphysical questions, and as a result are avoided by some empiricists [44]. My account avoids these kinds of questions, and is broadly in the spirit of strong empiricism of this kind.

(ii) The account avoids some of the outstanding problems for the Simple Conditional Analysis that were discussed some more detail in the previous chapter

(iii) Nonetheless, the account explains the intuitions behind the Simple Conditional Analysis – why it feels right to package these three conditionals together in this way.

[44] I have in mind versions of empiricism similar to the 'constructive empiricism' outlined by van Fraassen (1980).

There are a number of ways in which a suppositional could be incorporated into something akin to the Simple Conditional Analysis. One might:

1. Replace the SM counterfactual conditional but not the CA conditionals.
2. Replace the CA conditionals but not the SM counterfactual conditional.
3. Or replace all of the conditionals

I find each of these strategies interesting but none are entirely compelling, and none are the strategy that I employ here.

Strategy 1, in retaining the CA biconditional, remains an analysis. I do not attempt to, nor wish to, nor believe that it is possible to provide a true semantic analysis of dispositions. Upon this sort of analysis, if one were to infer that a glass breaks on the *supposition* that it is struck, that would literally mean that the glass is fragile. Also, if someone were to ascribe fragility to a glass, this would literally mean that they are making the claim that the glass will break on the supposition that it is struck. While I find this suppositional SM conditional somewhat more appealing than the metaphysically laden counterfactual SM conditional, this approach is still clearly flawed. For example, this approach does little to address finking and mimicking type counterexamples. I might happily, and perhaps correctly, ascribe fragility to a glass that will in fact not break when struck, due to being somehow protected. While I believe it is correct to eliminate the SM counterfactual conditional in favor of something like a suppositional, I also believe that retaining the project of semantic analysis is hopeless, and undesirable.

Strategy 2, in retaining the counterfactual conditional, retains the associated metaphysical issues. Given that my goal here is, as discussed previously, largely to provide a epistemically satisfying, but metaphysically thin account, strategy 2 is not compelling to me. Given that it also ceases to provide a semantic analysis, I expect that strategy 2 would not be compelling to many others either.

Strategy 3 is subject to the problem of nested suppositionals which I take to be a genuine problem [45]. My strategy for avoiding this problem is discussed in more detail below.

If I am employing neither strategies, 1, 2, nor 3, which strategy do I employ here? Rather than simply replacing a conditional, or all conditionals, in the Simple Conditional Analysis with suppositionals, I instead propose that a conditional inference can be made from each pair of the atomic elements of the Simple Conditional Analysis – S, M, and D – to the remaining third element. This conditional will be a suppositional. These are:

- S & M: D
- S & D: M
- D & M: S

Each of these represents an inference of a different type. That is, the inference to D, on the supposition that S and M, is a different form of inference to the inference to S, on the supposition that D and M.

[45] See McGee (1985) for problems involving nested suppositionals.

The inference from S & M to D, given its superficial similarity to CA←, I will call ICA← [46]. ICA← is best understood as expressing an *evidential* relationship. The stimulus and manifestation of a disposition provides us with evidence for the existence of the associated dispositional property.

The inference from D & S, to M, I will call ICA→ [47]. ICA→ is best understood as a sort of *prediction*. The instantiation of some disposition in some object, in conjunction with the occurrence of its stimulus, is grounds to predict an associated manifestation event. The two, when taken together, allow for non-vacuous or non-trivial *explanation* in terms of dispositions.

The inference from D & M, to S I will call ICA3 [48]. ICA3 is, or is at least rather like, an inference to the best explanation (IBE). The instantiation of some disposition in some object, in conjunction with its manifestation, is grounds to infer the occurrence of an associated stimulus event.

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[46] "I" signifies inferential.

[47] In my more detailed discussion of ICA→ which follows below, I will argue that ICA→ is superficially similar to CA→ in the same way that ICA← is superficially similar to CA←. This is my reason for calling it "ICA→" and not something else entirely.

[48] I call this ICA3 because unlike ICA→ and ICA←, this inference bears no real similarity to any of the 3 conditionals that comprise the Simple Conditional Analysis.

Given that ICA←, ICA→, and ICA3 each represent a difference *type* of inference – evidential, predictive, and explanatory – no biconditional can be constructed from their conjunction. Moreover, none of these three conditional inferences are truth functional. As such, I have abandoned the project of providing a semantic analysis in terms of necessary and sufficient conditions.

I do not intend for my account to be called a reinterpretation, an account, or a transformation of the Simple Conditional Analysis. Rather, my claim is that the sorts of motivations that one might have for advocating a semantic analysis of dispositions, such as the Simple Conditional Analysis, also motivate a type of pragmatic analysis of dispositions, such as the one that I outline here. My account is both metaphysically weaker, and epistemically richer than the Simple Conditional Analysis.

If my account is to be construed as an analysis, then it is an analysis of the pragmatic content of disposition ascriptions. Upon the Simple Conditional Analysis, asserting that an object possesses some disposition is literally to assert that it will manifest some behavior when stimulated. Upon my account, asserting that an object possesses some disposition is to assert all of ICA←, ICA→, and ICA3 with respect to that disposition.

In this chapter I begin by providing a brief overview of suppositionals. I go on to apply suppositionals to the elements of the Simple Conditional Analysis in place of the counterfactual conditional and material biconditional. These three conditionals can then be expressed in suppositional terms such that:

- S & M, D can be expressed as ‘D, on the supposition that both S and M’
- S & D, M can be expressed as ‘M on the supposition that both S and D’
- D & M, S can be expressed as ‘S on the supposition that both M and D’

I then detail each of ICA←, ICA→, and ICA3 in turn and argue that they comprise a web of inferences. To make a dispositional ascription is to assert that oneself is in a position to make each of these inferences.

4.2 Overt and covert dispositions.

The CA→ and CA← conditionals are sorts of relationships. Their relata are the SM conditional, and the predicate D. Before continuing with my discussion concerning the nature of these relationships, I need to briefly mention the nature of the relata between which these relationships hold. Bird (2009, p.19) refers to the predicate D, and the SM conditional as covert and overt dispositions, respectively.

According to Bird, covert dispositions are those that we use to make dispositional ascriptions without explicitly referring to the behaviors of the associated property. Such predicates as “fragile”, “soluble” and “elastic” serve as examples of covert dispositions. In the formulations of the CA→ and CA← conditionals, the predicate D represents the covert disposition.

Overt dispositional predicates are those that explicitly refer to the behaviors of the associated property. Such predicates instantiate the general form "is disposed to M when S" or similar. An example of such an instantiation would be "is disposed to break when struck". In the formulations of the CA→ and CA← conditionals, the overt dispositional predicate is represented by the SM counterfactual conditional, S □→ M.

Given the use of the biconditional between these relata, the covert dispositional predicate *just is* the overt dispositional predicate. Covert and overt dispositional predicates co-refer. For example, something can be said to be fragile if and only if it possesses the disposition to break when struck. Bird (2009, p.19) characterizes covert dispositional predicates as property *names* and overt dispositional predicates as property *descriptions*. He goes on to point out that equivalence is often assumed to hold between the two.

Given my rejection of the material biconditional, it should be unsurprising that *I reject the claim that overt and covert dispositional predicates co-refer*. So I endorse what I will call the *referential claim*.

Referential claim: overt, and covert dispositional predicates do not co-refer.

While I agree that covert dispositions refer to or name properties, overt dispositional predicates are descriptions not of properties but of *events* or *behaviors*, either potential or actual, associated with a thing possessing a property Breaking is not a property; breaking is an event, or a process. Being struck is not a property; being struck is an event. Likewise, breaking upon being struck is an event, or events, or a process; it is not a property. Given

that overt dispositional predicates refer to events, or behaviors, or perhaps processes under which a thing goes, and that covert dispositional predicates refer to properties of things, they cannot be said to co-refer. Essentially I am disagreeing with Bird's assertion that overt dispositional predicates describe properties. I believe that they describe events or processes that a property undergoes; not the property *itself*.

It might, I think correctly, be objected at this point that for Bird it is not the *events* that describe the property, but the SM *conditional*. That is, it might be objected that I have mistakenly focused upon the *relata* of the SM conditional and not the *relation*. For example, in the case of a fragile glass it is not the breaking upon being struck that describes fragility, but the truth of the claim that *if* the glass is struck, it *would* break. However, as stated above, and argued for below, I reject the SM *conditional* that appears in CA→ and CA← in favor of an inference from any pairing, or *conjunction* of S, M, and D, to the remaining element. This being the case, I am not arguing against Bird. Instead, I am providing an alternative that I believe to be more empirically appealing, metaphysically thinner, and epistemically richer.

The assumption of equivalence between overt and covert dispositional predicates is both misleading and is largely the root of many of the problems associated with conditional analyses of dispositions that have been described in previous chapters of this thesis.

The biconditional in the Simple Conditional Analysis, I claim, actually represents a claim about possible inferences. What is more, as stated above, and argued below, the two material conditionals that comprise the biconditional of the Simple Conditional Analysis

(CA→, and CA←) do not represent the same type of implication. This fact is a consequence of what I call the *inferential claim*.

> Inferential claim: Any pairing of S, M, and D, provides an inference ticket to the third.

It is from the inferential claim that I derive ICA←, ICA→, and ICA3.

I will elaborate upon and defend the referential and inferential claims below. I should note that the more important of these two claims is the inferential claim. My argument can be sustained despite rejection of the referential claim. To reject the inferential claim, on the other hand is, in a sense, to reject my thesis altogether. Much of this chapter is dedicated to establishing the inferential claim [49].

[49] It is quite possible to adopt my metaphysically thin account in addition to a metaphysically richer account involving counterfactuals and a material biconditional. While a primary motivation of this thesis is to avoid, or at least to provide an alternative to metaphysically thick accounts, I see no reason why one could not maintain a metaphysically thick account in addition to the thin one I provide here.

4.3 Suppositionals outlined.

I have in previous chapter reviewed various reasons for rejecting, or at least doubting, the Simple Conditional Analysis and its variants. We have seen examples above of the various ways in which the conditional analyses of dispositions can render dispositional ascriptions true when they should not be (as in the case of mimics) and false when they should not be (as in the case of confounders).

I concede that some conditional statements may be truth-functional. As Edgington concedes (1986, p.6), 'some conditionals are certain on *a priori* or other grounds'. A familiar example is 'everything that is a bachelor is an unmarried man'. As a true analytic claim, this follows purely in virtue of the meanings of the terms 'bachelor' and 'unmarried man'. The motivation behind providing an *analysis* of dispositions is to make dispositional claims analytic in this sense. As stated in previous chapters, and above, however, I do not believe that disposition ascriptions are the sorts of things that can be given this sort of analysis. In this chapter, I attempt to provide an alternative to this sort of analysis; an alternative which I believe to be more consistent with the general use of dispositional ascriptions and the inferences that we make concerning dispositions.

Edgington (1986 p.6), while conceding as I do that some conditionals are certain, states that it is an 'undeniable fact that many conditionals, like other propositions, are assented to or dissented from with a degree of confidence less than certainty' [50]. My proposal is

[50] So as to not misrepresent Edgington, it should be pointed out that she does not believe that conditionals are 'ambiguous' in the sense that some are truth functional while others are not. She states that her 'positive thesis has the consequence that self-evident

largely motivated by the view that, as expressed by Edgington, 'conditionals about which one may be uncertain cannot be understood in terms of truth conditions' (Edgington 1986, p.23).

While I think this is an interesting and important claim generally, I find it to be particularly relevant to dispositions as the mistake generally made by those who have attempted analyses of dispositions is to treat *a posteriori* claims as though they are somehow *a priori*. There are two primary ways in which this is the case.

First, the SM conditional makes claims concerning events of one type following, or perhaps being caused by, events of another type. Those who share my empiricist motivations will likely be similarly skeptical of any sort of *a priori* relationship holding between these events, or between these events and some other property.

Belief in the instantiation of some dispositional property in some object may motivate *predictions* concerning certain events following or being caused by other events. Observation of apparently dispositional behaviors constitute *evidence* for the instantiation of certain dispositional properties in certain objects.

These causal notions, and the predictions and evidential relations or inferences that come about as a result of them can reasonably be understood to be of an *a posteriori* nature.

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conditionals are certain – the consequent is certain on the supposition that the antecedent is true' (1986, p.23).

We might therefore reasonably be uncertain or have at least some small degree of uncertainty about such claims generally (Adams 1965, p.182). Indeed, Edgington points out that '"If", "before", "because"… in general, make contingent *a posteriori* claims about which there is plenty of room for uncertainty" (Edington 1986, p.23).

Second, I think the problems associated specifically with conditional analyses of dispositions, such as the now familiar confounders and mimics, suggest that we can reasonably be uncertain of attributions of dispositions. That is, we may reasonably be uncertain of the CA← and CA→ conditionals.

We can be uncertain that a dispositional property will bring about its behaviors, due to confounding circumstances. Hence, we can be uncertain of CA→. Also, we can be uncertain that the associated dispositional property obtains even if these behaviors do occur, due to the possibility of mimicking circumstances. Hence, we can be uncertain of CA←. Given that we *can* reasonably be uncertain about these conditionals, if Edgington is right, these conditionals are best understood as not having truth conditions.

According to a standard, truth functional account of the material conditional, the semantic aspect of the assertion of a conditional is equivalent to an assertion of its truth conditions. A conditional is straightforwardly true whenever both the antecedent and consequent are true. A conditional could be said to be trivially true just if both the antecedent and consequent are false. The conditional assertion "if it is raining outside then the ground is wet" seems true even when it is in fact not raining outside and the ground is not wet. A conditional can be true when the antecedent is in fact false and yet the consequent is true.

As above, the assertion that 'if it is raining outside then, the ground is wet' can be true when it is in fact not raining outside but the ground is indeed wet, perhaps due to my having recently watered the lawn. A conditional is straightforwardly false whenever the antecedent is true and the consequent is false. If indeed it is raining outside and yet the grass remains perfectly dry, then the conditional 'if it is raining outside, the grass is wet', is clearly false. This is the standard counterexample to the indicative conditional.

These conditionals have been reduced to plain assertions. That is, the claim 'if it is raining outside then, the ground is wet' is reducible to the two assertions; one being an assertion about whether or not it is raining outside, and the other being an assertion about whether or not the grass is wet. The truth-value of the conditional is dependent upon the truth-value of these two assertions. Arguably, not all conditionals are reducible to bare assertions in this way.

Edgington (1996, p.5) argues that:

> To assert or believe "If A, B" is to assert (believe) B within the scope of the supposition, or assumption, that A… Now, from a truth-conditional perspective, this double illocutionary force – an assumption, and an assertion within its scope – is eliminable – is reducible to, or equivalent to, a plain assertion.

However, she states:

> [T]his double illocutionary force is ineliminable; there is no proposition such that asserting it to be the case is equivalent to asserting B is the case given the supposition that A is the case.

So, according to Edgington, a conditional is not necessarily reducible to two separate assertions; A and B. Rather, conditionals are reducible to an assertion *and* an assumption, where the assertion falls within the scope of the assumption. For example, to assert 'if it is raining outside, the grass is wet' is really to say something like 'supposing it is raining outside, the grass is wet'.

It should be understood that it is the actual assumption that lacks a truth-value and not the fact that an assumption has or has not been made. The claim that I have made an assumption does have a truth-value; it is the sort of thing that can be true or false. The assumption itself, however, does not. Consider the following three types of claims concerning some state of affairs *p*.

(i) It is the case that *p*.

(ii) *X* supposes that *p*.

(iii) Supposing *P*.

Notice that claims (i) and (ii) are both propositions. (i) makes an assertion about *p*. (ii) makes a separate assertion about X's having supposed *p*. Both of these are factive assertions. It can be true or false that *p* and it can be true or false that *X* supposes *p*. (iii) is not a proposition and is not factive. However, (iii) is not a command or directive, or

some other sort of speech act. It is merely representative of the assumption that *p*. For example, I can suppose that it is currently raining outside. My supposition, being a mere supposition, is not the sort of thing that can be true or false. The *content* or *subject* of the supposition may be, as can the fact that I am making a supposition. The supposition itself, though, is a mental act, and acts have no truth value. I can also make an assertion within the scope of the supposition that it is raining outside. I might suppose that if it is raining outside, then the grass is wet. Because this assertion that the grass is wet falls within the scope of the supposition that it is raining, neither it, nor the conditional that holds between them, is a proposition, or factive assertion.

Recall that Martin's (1994) original presentation of finking problems was a particular example of the more general problem of the so-called 'conditional fallacy in contemporary philosophy' due to Shope (1978). Martin was demonstrating that the claim that the truth-value of a conditional is dependent on the truth-value of its antecedent is problematic in the special case of conditional analyses of dispositions. One potential way of avoiding this problem is to separate the value of the conditional from the value of the antecedent. Edgington (1986, p.18) points out that her suppositional account achieves just this.

In order to understand how it is that the suppositional antecedent does not determine the value of the consequent, it might help to consider the following example provided by Edgington (1986, p.13). I might wonder what the possibility is of a fair die landing on 6 if it lands on an even number. The supposition here is that the die lands on an even number. Within the scope of that supposition, there are three possibilities. The die might

land 2, 4, or 6. So, on the supposition that the die lands on an even number, the chance that it lands on 6 is 1/3. A material conditional, however, will be true whenever the antecedent is false. This being the case, on an account in terms of the material conditional, the conditional will be true whenever the die lands not even, or 6. That is, it will be true when it lands on 1, 3, 5, or 6. So, on the account in terms of a material conditional, the conditional 'if the die lands on an even number, it will be 6' is true in 2/3 cases.

The difference in the suppositional and truth functional approaches to the conditional 'if the die lands on an even number, it will be 6' is that on the suppositional account, 'in considering how likely it is that if A, B, one assumes A, that is, ignores the possibility that [not] A. Relative to that assumption, one considers how likely it is that B' (Edgington 1986, p.17). So, we are to believe a suppositional whenever we judge A *and* B to be nearly likely as A, or whenever we judge A *and* B to be *more likely* than A and not B. Importantly, Edgington (1986, p.17) states that 'one does not have to decide how likely it is that A in order to judge that B is likely given A'. For example, I might consider it to be highly unlikely that a fire-breathing dragon will attack me on my next bicycle ride. However, I can be quite convinced that on the supposition that a dragon does indeed attack me on my next bicycle ride, I will likely be eaten. I can be very confident in that suppositional while being highly uncertain of its antecedent. The point of this, as stated by Edgington (1986, p.18) is that '[t]his measure has the advantage of allowing the probability of the conditional to be independent of the probability of the antecedent. On the truth functional account, the probability that if you toss a coin it lands heads depends crucially on how probable it is that you toss it'.

Martin's original case of finking demonstrated a specific case of the way in which having the value of a consequent depend on the value of an antecedent is problematic. Edgington has furnished us with the means of making conditional claims of which the value of the consequent does not depend on the value of the antecedent. As such, she has provided us with a potential means of avoiding Martin's problems with conditional analyses of dispositions. This being the case, I attempt to apply Edgington's suppositionals in order to retain something resembling the inferences involved in the intuitively attractive Simple Conditional Analysis while avoiding Martin's confounding and mimicking problems.

4.4 Suppositionals applied.

With Edgington's positive thesis broadly outlined, it can now be applied to the special case of dispositions.

An analysis of the SM conditional in terms of Edgington's suppositional would have the following form: 'supposing a certain stimulus event occurs, an associated manifestation event will occur'. Or:

Suppositional SM: 'supposing S, M'

To provide a specific example, I might suppose that 'if I drop my glass to the floor, it will break'. This seems to accord perfectly well with our common reasoning about objects. Our beliefs about dispositions can be thought of as a sort of folk physics in just the same way that our beliefs about the mental states of others can be thought of as a sort of folk

psychology. Because we have such beliefs, we frequently make suppositions involving them. Because I have the belief that my glass is fragile, and that fragile things break when dropped, I might reasonably suppose that 'if I drop my glass to the floor, it will break'.

The point of the Simple Conditional Analysis, and its more sophisticated variants, however, is to link the overt disposition captured by SM, with the covert disposition captured by D.

An analysis of CA→ in terms of Edgington's suppositional would have the following form: 'supposing a dispositional property is instantiated in some object, then supposing its relevant stimulus event occurs, an associated manifestation event will occur'. Or:

Suppositional CA→: 'supposing D, (supposing S, M)'

To provide a specific example of this, elaborating on the one given above, I might believe that 'supposing my glass is fragile, then supposing I drop my glass to the floor, it will break'.

Because the Simple Conditional Analysis involves a counterfactual conditional nested within the scope of a material biconditional, a straightforward exchange of conditionals for suppositionals will involve nested suppositionals. This is consistent with what I referred to in the introduction to this chapter as strategy 3. As noted there, McGee (1985) points out that this approach is problematic. As such, I employ a strategy below that crucially does not employ nested suppositionals.

I will express CA← and CA→ as a supposition and a conjunction, rather than as a supposition within the scope of another supposition.

I have previously stated that CA→ and CA← express different sorts of relationships between their relata. As I have presented it here, they both express suppositions. While this is the case, as I develop CA→ and CA← into suppositional variants I will argue that the nature of those suppositions are different. The suppositional variant of CA→ is predictive. The suppositional variant of CA← is evidentiary, or perhaps explanatory.

I need to be clear about the nature of what exactly is being supposed in the suppositional versions of CA← and CA→. In my presentation of Edgington's negative argument, I showed that in many cases, it is our background beliefs and assumptions concerning both the existence or otherwise of the ground of the disposition, and the conditions surrounding its stimulus, that fixes our belief in the obtaining of the conditional that we associate with the disposition. Recall that when someone is certain that A is true and that B is true, and yet they remain uncertain as to whether 'if A, B' is true, the content of whatever background beliefs they have concerning the disposition to manifest B in response to A will fix their belief in 'if A, B'. I tabulated this as follows:

A	B	Background belief	If A, B
T	T	T	T
T	T	F	F
T	T	Uncertain	Uncertain

In this case, when A and B are both assumed to be true the values of A and B are irrelevant to the value of 'if A, B'. Consider the same thing in the case of CA→.

D	S→M	Background belief	D→(S→M)
T	T	T	T
T	T	F	F
T	T	Uncertain	Uncertain

In this case, the values of D, and of the SM conditional are irrelevant to the value of CA→. This seems intuitively incorrect. This, I believe, is because in our actual epistemic practices concerning dispositions, D, and S are conjoined. Consider this example: if someone believes that fragility is instantiated in some glass, then they will likely believe it true of the fragile glass that 'if it is struck, it will break'. If they do not believe that the glass is fragile, they will believe the associated conditional to be false. If they do not have a belief concerning the fragility of the glass one way or the other, they will not have a belief concerning the truth of the conditional 'if it is struck, it will break'.

My point is that this should not be ignored. Nor should it be considered a problem. It is a feature of the *a posteriori* and empirical nature of our beliefs concerning, and reasoning about, dispositions that this is the case.

When the above belief structure is tabulated, the following results:

Fragile D	Struck S	Fragile and Struck D & S	Breaks M
T	T	T	T
F	F	F	F
T	F	F	F
F	T	F	F
F	U	U	U
T	U	U	U
U	T	U	U
U	F	U	U

Notice that unlike the previous tables, that leave undefined the nature of the 'background belief', when that belief is understood as being the conjunction of the instantiation of the disposition and its stimulus, the intuitively correct result obtains.

My claim here is that CA→, and its suppositional variant, are best *not* understood as conditionals within the scope of another conditional, but as a conjunction of beliefs within the scope of a conditional.

In accepting background beliefs, then, the suppositional versions of CA← and CA→ can be refined by application of the laws of exportation and importation. McGee (1985, p.464) states that 'we assert, accept, or believe a conditional of the form [D → (S → M)] whenever we are willing to assert, accept, or believe the conditional [(D & S) → M]'.[51]

This approach seems entirely fitting with the way in which we reason about dispositions. I will call this transformation of CA→, ICA→.

ICA→: (D & S): M

[51] I may be criticized at this point for relying upon import/export rules. I should point out that I am not really doing so. I do not claim that there exists *a truth-preserving* inference from CA→ to ICA→, and from CA← to ICA←. I have presented my argument in this way simply so that my formulation of ICA→ does not appear arbitrary and to establish a certain similarity or familiarity between it and CA→. What has been left implicit here, is my belief that when endorsing CA→ the S can be mentally conjoined with D in making the inference to M. My goal here is to establish my *inferential claim*. The above narrative is just one way of doing this.

This states that upon the supposition that both disposition is instantiated in some object *and* that a relevant stimulation event occurs, then an associated manifestation event will occur.

For example, I might predict that my glass will break on the supposition that the glass is fragile and that it falls to the floor. I will not predict that the glass will break on the supposition that it falls to the floor if I do not *also* suppose it to be fragile. Nor will I predict that the glass will break on the supposition that it is fragile if I do not *also* suppose that it falls to the floor.

A similar strategy can be employed with CA←. I will call this transformation of CA←, ICA←.

ICA←: (S & M): D

This states that upon the supposition that a stimulus event occurs and a relevant manifestation event occurs, then an associated disposition is instantiated in some object. For example, I might believe that my glass is fragile on the supposition that it is both dropped and broken. I will not believe that it is fragile on the supposition that it is dropped if I do not *also* suppose that it breaks. Nor will I believe that the glass is fragile on the supposition that it breaks if I do not *also* suppose that it fell to the floor. I will not believe that the glass is fragile on the supposition that it breaks if I do not *also* suppose that it fell to the floor because falling to the floor is the stimulus that I have associated with fragility. The supposition that the glass breaks is not sufficient for my belief that it is fragile. The

glass may have broken due to having been struck with tremendous force by a very large hammer. I would not believe the glass to be fragile under the supposition that it breaks and is struck with a very large hammer [52].

There is a third permutation here that is not implied by the Simple Conditional Analysis, and as such seems to have had no attention in the literature, but I think bears mentioning as it seems that it might play some part in our reasoning concerning dispositions. Analyses of dispositions contain three elements. D, S, and M. ICA→ and ICA← contain two separate conjunctions of those three elements, linked by a suppositional to the third. There is, of course, another permutation of conjuncts D and M, which can be linked by a suppositional to the third element, S. This would yield what I will call ICA3, simply because it does not map to either of the directions of implication in the biconditional of the Simple Conditional Analysis .

ICA3: (D & M): S

This states that upon the supposition that a disposition is instantiated in some object and is manifested, a stimulus event will have occurred. For example, I might believe that my glass was dropped on the supposition that it is both fragile and broken. I will not believe

[52] There is of course an issue here concerning the way in which certain dispositions are to be defined in different contexts. I may not consider a steel beam to be fragile, especially in comparison to my glass, but an engineer constructing a bridge may judge the steel beam to be too fragile to be used. This issue of context sensitivity is covered in Chapter 6.

that it is broken on the supposition that it is dropped if I do not also suppose that it is fragile. Nor will I believe that it is dropped on the supposition that it is fragile, if I do not also suppose that it is broken [53].

When understood in this way, the Simple Conditional Analysis has three non-conditional, atomic elements. S, M, and D. Two of these - S and M - are observables, while one - D - is unobservable. I will graphically represent this claim like this:

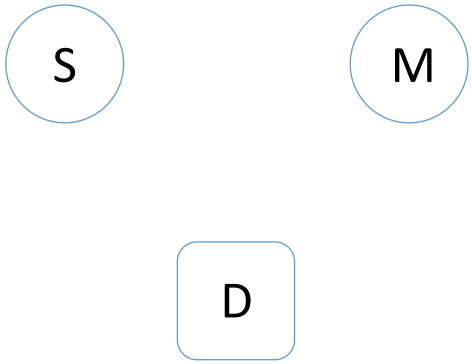

Figure 1: The three elements of the Simple Conditional Analysis

Each of these elements can be conjoined with one of the others. When they are so conjoined, we are provided with what is essentially an 'inference ticket' to the third. Ryle argues that 'dispositional statements about particular things… are inference tickets, which license us to predict, retrodict, explain, and modify these actions, reactions and states' (1980, p.119). In what follows, I will propose an overview of ICA→, ICA←, and ICA3.

[53] Problems with, and perhaps counterexamples to, ICA→, ICA←, and ICA3 may be apparent at this point. I will elaborate upon, and attempt to defend against, some of these problems in their relevant subsections below.

I will attempt to outline the nature of the relationship that each pair holds to the remaining element of the Simple Conditional Analysis and of the inference ticket that it licenses.

4.5 Prediction.

I propose that the ICA→ is effectively a *prediction*. That is, this conditional expresses the claim that on the supposition that a dispositional property is instantiated in some object *and* some stimulus event occurs, then it is reasonable to predict an associated manifestation event. This requires the antecedent supposition concerning the instantiation of the associated dispositional property. It is not reasonable to predict the bouncing of a dropped ball if one does not also suppose that the ball is elastic. Informally: if one has knowledge of or belief in the existence of some dispositional property *and* of the stimulus of that property, then one can reasonably *predict* the associated manifestation event. To re-use Ryle's expression, the conjunction of S and D comprises an inference ticket that licenses a prediction of M. Or, in suppositional terms, if one supposes that some dispositional property is instantiated in some object and that it is stimulated, then one can reasonably predict its manifestation. For example, there is a glass upon my table. Upon the supposition that the glass possesses the property of being fragile and that the glass is dropped to the ground, I can reasonably predict that the glass will manifest its fragility by breaking or cracking or shattering or some such. This is, of course, how we routinely reason about such things. This relationship can be graphically represented like this:

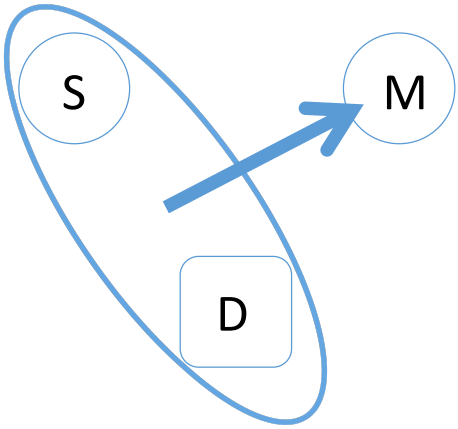

Figure 2: Prediction

Predictions are, of course, uncertain things. We can make inaccurate predictions. This might be due to the either the mistakenness or incompleteness of our antecedent suppositions. For example, my prediction that a glass will break when struck might be inaccurate because I was mistaken in my belief that it possessed the property of fragility. Alternatively, my prediction might be incorrect because I did not include in my antecedent suppositions, the supposition that the glass would land on very soft carpet, or was protected by bubble wrap, or some other confounding condition [54].

The suppositional account seems appropriate to this sort of uncertain conditional relationship. In following Adams (1965, 1975) Edgington states that 'a person's degree of confidence in a conditional, if A, B, is the conditional probability he assigns to B given

[54] It is at this point that some sort of normalisation condition is usually employed. This might be something like closeness of possible worlds, *ceteris paribus* conditions, 'normal circumstances' or the like. These are the subject of Chapter 6.

A' (1986, p.17). I suggest that the predictive nature of dispositions be given this sort of interpretation. Supposing we have some background belief that a glass is fragile, our confidence in the belief that the glass will break when struck is the probability we assign to the breaking of the glass, upon the supposition that it is struck and that it is indeed fragile.

The following claim made by McKitrick nicely summarizes this view:

> To say that disposition statements entail counterfactuals is perhaps too strong: but we can admit this much: if you know that something has a certain disposition, and that it will be subject to the circumstances of manifestation, you have some basis for predicting its behavior. For example, if you know that a sugar cube is water-soluble, and that it is about to be placed in a beaker of water at room temperature, you have good grounds for predicting that it will dissolve (2003, p.351).

The ICA→ conditional involves knowledge of or belief in the existence of some dispositional property in order to be a reliable inference. For example, we are licensed to predict that a ball will bounce on the supposition that the ball is dropped *and* given knowledge of or belief in the elasticity of the ball. We will not be licensed to make this inference if, for example, we know or believe that the ball is made of concrete rather than rubber (and that we know or believe that objects made of concrete are not disposed to bounce). Nor will we be licensed to make that inference if we have no knowledge of the relationship that holds between a certain physical property and the behaviors that it

produces. For example, if I had no knowledge of the way that an airfoil works, I would not predict that an airplane wing would generate lift when air flows over it. Perhaps somewhat less intuitively, it seems doubtful that someone, perhaps an infant, would predict that a ball will roll if pushed, if they had no prior beliefs concerning the behaviors produced by spherical objects. In each of these cases, this knowledge has, or these beliefs have, been generated in an *a posteriori*, empirical manner.

The issue here, of course, is that we often, or perhaps *always*, have degrees of belief in the existence or otherwise of these properties that are less than absolute knowledge. Given that our knowledge concerning the existence or otherwise of some dispositional property is of an *a posteriori* and empirical type, there is always room for some degree of uncertainty concerning such beliefs. The antecedent would never, or perhaps very rarely, be absolutely *known*. At best, we can have something like strongly justified beliefs concerning the existence or otherwise of dispositional properties *and* importantly of the behaviors that they produce.

This is in no way a problem for the suppositional account. The suppositional account does not require certainty of the antecedent. Indeed, this lack of certainty of the antecedent seems entirely consistent with our actual practices concerning dispositional properties and the behaviors that we associate with them. I frequently reason about objects about which I am less than certain. Upon seeing a glass on a picnic rug, I will be a good deal less than certain that it will break if I knock it over. It may very well be a durable plastic glass.

4.6 Evidence.

The ICA← conditional is used to express a relationship between the behaviors associated with a dispositional property and the property itself. For example, I might say that on the supposition that something breaks when struck, then that thing is fragile. Again, I construe this as an empirical, *a posteriori* and synthetic matter. What I mean by the claim that something can be judged to be fragile on the supposition that it breaks when struck is that if something does indeed break when struck, then we have *evidence* for the instantiation of the property of fragility in that object. Under these conditions it will be reasonable to infer that the object that breaks when struck is indeed fragile. This can be graphically represented as:

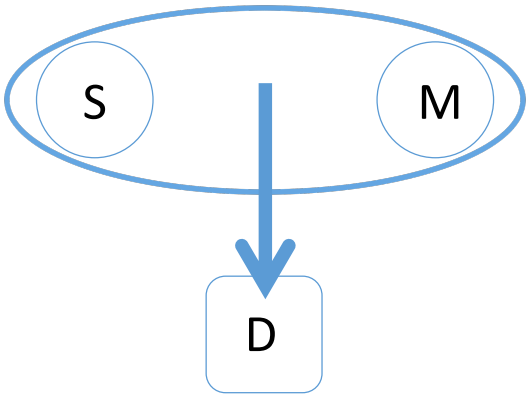

Figure 3: Evidence

There are, however, problems associated with making an inference from overt dispositions to their covert counterparts. These are the now familiar mimicking type, and related, problems. I will attempt to demonstrate how ICA← addresses these sorts of problems.

Problems with CA←, therefore, attempt to demonstrate that the SM conditional (which I interpret as a conjunction of S and M and not as a conditional statement at all [55]) can be true while the associated dispositional property does not exist.

I have already provided a number of examples of mimicking type problems and how it is that they serve as good counterexamples to CA←. As such, I will not provide yet another example here. I will claim, however, that what these sorts of problems suggest is that at best, the manifestation of an overt disposition could be highly suggestive of, or constitute very good evidence for the instantiation in some object of its associated covert disposition. So, the SM conditional does seem to have some sort of relationship with its associated physical property but this relationship is not the sort of relationship that is suggested by standard interpretations of the conditional linking the two.

What I suggest here is that rather than some sort of strict logical entailment, the truth of the SM conditional provides evidence for the existence of whatever property was involved in its manifestation. The manifestation of some disposition in response to some stimulus has epistemic but not ontological importance. That is, if the ICA← conditional is reasonable to assert, this does not mean that it is the case that the disposition does *in fact* obtain. Rather, it constitutes *grounds for believing* it to be the case that the disposition obtains. Evidence, of course, can be wrong. These cases in which the evidence is wrong,

[55] This is largely for Humean type empiricist reasons. S and M are distinct events. No *logical* entailment can hold between them.

or in which our reasoning using that evidence leads us to make incorrect inferences are the mimicking type problems.

The relationships between evidence of a disposition and the existence of a disposition could be categorized as follows:

(i) Evidence of a disposition and that disposition exists.

(ii) Evidence of a disposition but that disposition does not exist.

(iii) No evidence of a disposition but a disposition exists.

(iv) No evidence of a disposition and a disposition does not exist.

Scenario (i) can be understood as being an ideal evidential relationship. This is a situation in which, for example, a glass breaks upon being struck gently and does indeed possess the property of fragility. No mimicking scenario has occurred.

Scenario (ii) is the standard mimicking scenario. This is a situation in which, for example a glass breaks upon being struck gently although it does not possess the property of fragility.

Scenario (iii) is one in which a glass may indeed possess the property of fragility, even though it does not, or perhaps never manifests the behaviors associated with the possession of that property. In order to not unnecessarily complicate this discussion, I will ignore the possibility that the lack of evidence is due to some sort of confounding condition. It does bear mentioning, however, that when a disposition is not manifested,

we ought to attempt to understand the *reason* for its lack of manifestation. Upon the ICA← conditional, there will be no evidence of a disposition when the antecedent (S & M) is false. Because the antecedent is a conjunction, it can be false in 3 ways.

First, it might be the case that the disposition was stimulated but did not manifest. This would be a straightforward case of confounding [56]. Second, it might be false because it was not stimulated but did manifest. This is rather *like* a case of mimicking but is not a genuine case of mimicking because in this case, the disposition does exist, whereas in cases of mimicking, the disposition does not exist, but merely appears to. Rather, this case is best thought of as a case of spontaneous or perhaps necessary manifestation. I deal with this case more thoroughly in my treatment of the D → M and M → D conditionals below. As such, this is not a case of there being no evidence of a disposition but is instead a case of there being no evidence of a *disposition that requires a stimulus* [57].

The third, and paradigmatic case of (iii) is a case in which there is neither a stimulus nor manifestation. When understood in this way, situation (iii) is commonplace. Frequently we observe and interact with objects and we attribute to them certain dispositions, even when those dispositions are neither stimulated nor manifested. I see any number of glasses

[56] I think it is interesting that when understood in this way, confounders can be problems for ICA← in addition to ICA→. In contrast to the truth functional account, confounders are usually considered to be problems for CA→ but not for CA←.

[57] Dispositions that do not require stimuli are discussed in more detail below.

and mugs each day and I generally believe them to possess the property of fragility, even though they are not being broken, nor struck.

Scenario (iv) is, like (i), a sort of ideal epistemic situation. Frequently we observe objects that give no indication of possessing a certain disposition. These objects give no indication of possessing this disposition simply because they do not possess it. Bicycles, for example, do not give the appearance of being water-soluble. The reason that they do not give the appearance of possessing that disposition is simply because they do not possess it.

The apparently problematic cases, here are (ii) and (iii). So how does the suppositional account treat (ii) and (iii)? Recall that on the suppositional account of ICA←, I can reasonably believe that some dispositional property exists on the supposition that that disposition is stimulated and manifested. Situations (ii) and (iii) on the suppositional account can be treated rather like a sort of miniature thought experiment.

Upon a suppositional approach to (iii) I might see a glass sitting upon a table. There is no outward evidence available to me concerning the fragility or otherwise of the glass. I can, however, *suppose* that the glass breaks in response to being struck. Within the scope of this supposition I might reasonably believe or assert that the glass possesses the property of fragility.

This is a good example of my general thesis that problems associated with dispositions are epistemological rather than ontological. Situation (iii) is an example of an

unmanifested disposition. This problem of unmanifested dispositions is one that has not gone unnoticed in the literature. Goodman, now famously, states that 'besides the observable properties it exhibits and the actual processes it undergoes, a thing is full of threats and promises' and that 'they strike us by comparison as rather ethereal' (1983, p.40). Bird, (2006, 2009) states that it is sometimes said of dispositions that they have 'too much potentiality' and 'too little actuality' [58]. It is, however, like many problems associated with conditional analyses of dispositions, usually treated as an ontological problem. Treating these problems as being of an epistemological rather than an ontological nature, completely avoids this set of problems.

Upon a suppositional approach to (ii), which is basically a mimicking situation and the situation that is generally considered to be a counterexample to CA←, I might suppose that a glass breaks upon being struck. Within the scope of this supposition I might reasonably believe or assert that the glass possesses the property of fragility.

Of course upon scenario (ii) I would be incorrect in my ascription of the property of fragility to the object. *I see no problem with this*, however. It needs to be appreciated that ICA← is an inference from a conjunction of observables to an unobservable. Such an

[58] See Bauer's (2012) discussion of the 'Problem of Being' for a related ontological treatment of this sort of problem, applied specifically to pure or bare dispositions.

inference is of a *a posteriori* nature and the beliefs that we have concerning such relationships are generated in an *a posteriori* manner[59].

As such, ICA← is, unlike CA←, a synthetic claim, and not an analytic one.

We are frequently wrong about synthetic claims. This situation does not constitute a counterexample to the suppositional analysis. It is, rather, a situation in which I am simply mistaken in my judgment.

I made reference above to situations in which there was an absence of evidence for the existence of a dispositional property. But what about situations in which there is evidence of an absence of a disposition? Are these the same thing? I suggest that they are not. Consider the following situations:

(v) Evidence of absence of a disposition but a disposition exists.

(vi) Evidence of absence of a disposition and a disposition does not exist.

[59] This may be through induction or it may be through some other knowledge generating process. It is not my aim here to attempt to understand this process. I think it is sufficient to point out that as a matter of fact we come to learn about the behaviors that we associate with certain dispositional properties in an *a posteriori* manner.

It might appear that (v) represents the same situation as (iii), and that (vi) represents that same situation as (iv). This is not the case. An absence of evidence is not the same as evidence of an absence[60].

The lack of evidence for the existence of a dispositional property might be a situation in which neither the stimulus nor manifestation events occur. When this sort of situation obtains, we have no direct evidence for the existence of a dispositional property one way or another.

We may, however, have some sort of indirect evidence. One way in which we might have indirect evidence for the instantiation of a dispositional property in some object is by its similarity to other objects, which we believe to possess that dispositional property. I call this sort of evidence 'indirect' because this evidence, if it can be called that, is based upon the observation of dispositional behaviors in other suitably similar objects, and not in the particular object in question.

Evidence for the absence of a dispositional property, however, might be a situation in which the stimulus event occurs but the manifestation event does not. When this sort of situation obtains we have evidence that suggests that the associated dispositional property does not exist.

[60] The aphorism 'absence of evidence is not evidence of absence' is usually attributed to Martin Rees, as cited in Berendzen (1973, p.1).

But what about a situation in which the manifestation event occurs but the stimulus event does not? I would suggest that it might be the case that a dispositional property has indeed manifested in the absence of a stimulus. Some dispositions, if they can still be called that, continuously, or perhaps necessarily, manifest; they do not require stimuli. When this sort of situation obtains, it is not the case that we have evidence of the absence of a disposition. Rather, we have evidence of the absence of the sort of disposition that requires a stimulus in order to manifest. Under these conditions we would have evidence for the absence of a *particular type of disposition*.

4.7 Inference to the best explanation.

A conditional inference that has not, to my knowledge, had any attention in the dispositions literature is what I call ICA3. ICA→ represents an inference from the conjunction of a belief in an unobservable dispositional property and its observable stimulus condition to the observable manifestation of that disposition. I have characterized this inference as being a prediction of sorts. ICA← represents an inference from the observable behaviors that we associate with a dispositional property to that property. I have characterized this as being an evidential relationship. ICA3 is, in a manner somewhat similar to that of ICA→, an inference from the conjunction of a belief in an unobservable dispositional property and the observable manifestation of that property, to its stimulation. According to ICA3, we can believe or assert that a certain stimulus occurs on the supposition that both a dispositional property is instantiated in some object and that it is manifested. This is represented graphically as:

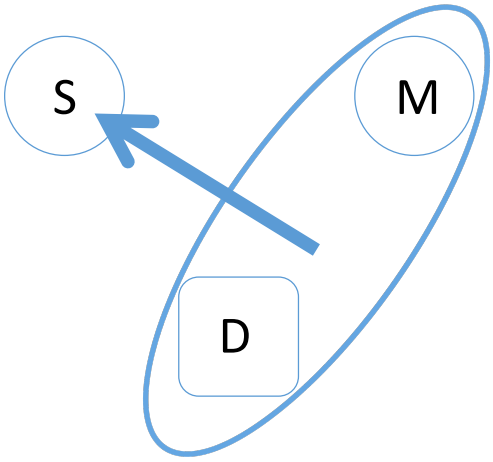

Figure 4: Inference to the best explanation

This inference form is what Harman (1965, p.88) calls an 'Inference to the Best Explanation' (IBE). According to Harman's presentation of IBE 'in making this inference one infers, from the fact that a certain hypothesis would explain the evidence, to the truth of that hypothesis (1965, p.89). Of course I would express this in terms of *degrees of belief* in the hypothesis, rather than in terms of the *truth* of the hypothesis. The basic form, however, remains the same:

1. We are presented with certain observable evidence.
2. We consider a number of hypotheses that could explain the evidence that is available to us.
3. We consider one of these hypotheses to *best* explain the available evidence.
4. We believe to some degree, or assert that hypothesis.

Harman provides two simple examples of how this sort of inference works in practice:

> *When a detective puts the evidence together and decides that it must have been the butler, he is reasoning that no other explanation which accounts for all the facts is plausible enough or simple enough to be accepted. When a scientist infers the existence of atoms and sub-atomic particles, he is inferring the truth of an explanation for various data which he wishes to account for* (1965, p.89).[61]

To provide a similar example in dispositional terms, imagine a scenario in which we walk into a room and see a glass broken on the floor. We might suppose that the glass was broken and that it was indeed fragile. Based upon this supposition, we might infer that the glass was dropped.

What of counterexamples to ICA3? Confounders are used as counterexamples to CA→ and to ICA→, mimics are used as counterexamples to CA← and ICA←, but what would constitute a counterexample to ICA3? Intuitively, this would be a scenario in which both

[61] Harman's second example; that of the scientist inferring the existence of unobservables such as atoms and subatomic particles, is exactly the inference that is made in ICA←. I characterize ICA← as expressing an evidential relationship between the observable stimulus and manifestation of some disposition to the existence of the associated dispositional property. The nature of the inference that is being made can, I think, be understood as being an IBE.

a disposition obtains and is manifested and yet is not stimulated. Counterexamples are implied by the very terminology of inference to the *best* explanation. In making an inference to the *best* explanation, we acknowledge that that the explanation to which we appeal is to the best of a number of potential explanations. Each of these other potential explanations are potential counterexamples to the reasonableness of our inference to S on the supposition that D and M [62]. To illustrate, we might believe that the glass in the above example was carefully deconstructed; perhaps with a sophisticated laser cutting tool, or that the broken pieces were arranged in a particular way by a prankster, or that perhaps the broken pieces are not the broken pieces of a glass but are a number of separate intact pieces that appear to be broken parts of a glass.

Notice, however, in each of these cases, it might be interpreted that it is not the stimulus that has changed but the manifestation. The manifestation of fragility can be understood in two ways. First, we might consider the manifestation of fragility to simply be the result of a breaking process. This is fairly consistent with a straightforward empirical approach. To observe the manifestation of fragility is just to observe broken stuff. The second way in which manifestation might be understood is as a process and not just the result of the process. Upon this second approach, the counterexamples above are not genuine counterexamples. Observation of pieces of glass on a floor is not observation of the process of breaking. Suppose the apparently broken pieces of the glass are in fact not broken pieces of a glass but intact objects that are arranged, either accidentally or deliberately, in such a way as to appear to be broken pieces of a glass. Observation of

[62] See, for example, van Fraassen (1989) for a discussion on strategies and problems involved with selecting a *best* explanation.

these pieces of glass is, on the second approach, not observation of the manifestation of fragility. Nothing broke when struck. Hence, nothing manifested its fragility.

The number of potential explanations that are available to use is, however, limited by the nature of our antecedent suppositions. Any explanation that involves the denial of either of the conjuncts of the antecedent - that the glass was fragile or that it is broken - is *not* available to us. We are making an inference to the explanation that the glass was dropped *on the supposition* that the glass was both fragile and broken. In order to avoid triviality, then, it seems that it must be stipulated that manifestation be understood in the first sense. To observe the manifestation of a disposition is to observe the result of the process of that manifestation and not of the process. If we understand manifestation in the second sense, then nothing could constitute a counterexample to ICA3. Given that nothing could constitute a counterexample, there are no alternative explanations. Given that there are no alternative explanations, the explanation to which we appeal cannot genuinely be understood to be the *best* of a number of *potential* explanations.

4.8 Manifestation without stimulus.

I suggested in my discussion of ICA← that there might be situations in which a manifestation event occurs in the absence of a stimulus event. The SM conditional and the nature of its relationship to the covert disposition D have been discussed at length in the literature. What has not received a great deal of attention is what I call the DM conditional. This conditional states that on the supposition that a certain dispositional property is instantiated in some object, we might believe or assert that it manifests.

Importantly, it does so in the absence of any sort of stimulus. This is represented graphically as:

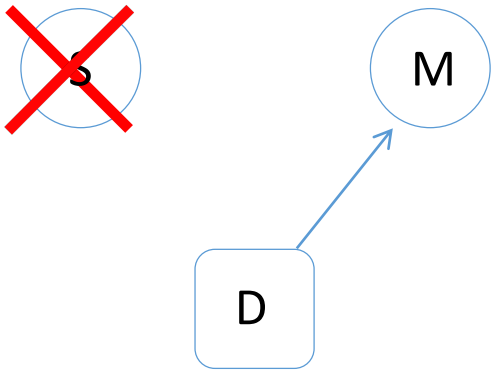

Figure 5: No stimulus 1

Some dispositions appear to have no stimulus conditions. I agree with Lowe's assertion that 'not every physical state that is apt to be described as a "disposition" can plausibly be assigned a "stimulus"' (2011, p.22). The charge of an electron serves as an example. The mere existence of their possessors is sufficient for the manifestation of these types of disposition. As such, we need not include the S from the Simple Conditional Analysis such that it now becomes merely 'if D, M'. This is entirely intuitive and consistent with the nature of these sorts of properties. If a massive object exists, then all other massive objects are effected by its mass. This manifestation may not necessarily be apparent to some observer but appearance is not a necessary condition for the existence of these properties. There are all sorts of scenarios in which we either do not, or perhaps even *cannot* observe the manifestation of a certain disposition [63]. Consider an electron that is

[63] This is obviously an empirically problematic claim, and given that my thesis is motivated by a strong sense of empiricism, this may appear to be a problem for me.

somehow separated from the influence of all other objects. This electron might exist in an otherwise empty universe, say. This electron will still presumably possess its charge, its disposition to, among other things, repel objects with like charge, but cannot be observed to manifest this disposition, as there are no objects for it to interact with. On the suppositional account, however, it can be asserted that the electron will manifest its disposition to repel like charged objects *on the supposition that* it comes into contact with such an object. Being an epistemic claim, this assertion does not come with the ontological 'baggage' of a similar claim in terms of counterfactuals.

4.9 Summary.

I have attempted to establish two main claims concerning the nature of the conditionals that appear in the Simple Conditional Analysis. First, the Simple Conditional Analysis is actually expressing 4 separate conditionals: ICA→, ICA←, ICA3, and DM, which is ICA→ without the antecedent supposition of a stimulus. Second, each of these conditionals actually represents a different sort of inference. As such, I make the further claim that the biconditional that appears in the Simple Conditional Analysis does not capture, precisely, the distinct sorts of conditional claims that are entailed by disposition ascriptions. Represented using the same graphical schema that I have used above, and leaving out the DM conditional, the Simple Conditional Analysis really looks more like this web of inferences:

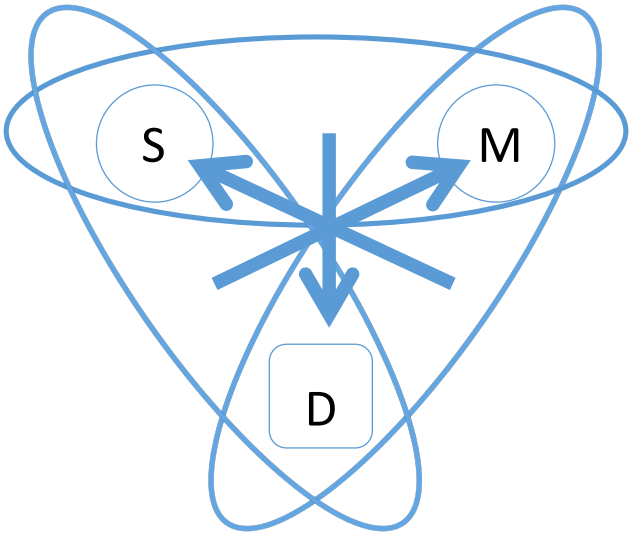

Figure 6: Dispositional inference web.

Upon this web, any two elements license an inference ticket to the third. These inferences, each of which is a transformation of the elements of the Simple Conditional Analysis, and yet are each quite radically difference from the sorts of inferences involved in the Simple Conditional Analysis, map directly to a common inference type in which dispositions are used [64]. These are: a predictive inference, an evidential inference, and an inference to the best explanation. Having an understanding of this inference web is what it is to have an understanding of the functional role that a disposition concept plays in our understanding of the physical world.

[64] This is by no means intended to be a truth preserving transformation.

5 Dispositions and functionalism.

5.1 Introduction.

In the previous chapter I argued that there are a number of inferential relationships between the observable behaviors associated with dispositions (S and M; the constituents of the SM conditional), and an unobservable property (D) that can be captured by Edgington's suppositional; that these provide a reasonable explanation of our use and acceptance of conditional expressions concerning dispositions, and that this stands as a plausible alternative to the metaphysically committal account of dispositions, such as the Simple Conditional Analysis.

While I have attempted to keep my account metaphysically minimal, it is not completely without metaphysical content. In this chapter I provide an overview of a possible metaphysical companion to my account. I will argue that a functionalist approach to dispositions, that is in some ways similar but by no means identical to that provided by the likes of Mumford (1996, 1998), and Malzkorn (2000), is a good option insofar as there exist some important consistencies between functionalism, particularly of the so called 'Canberra Plan' variety, and my suppositional account.

I do not wish to argue for a functionalist account of dispositions generally. Such an argument could constitute an entire thesis in itself. Instead I simply wish to point out that it stands as a good companion to my account of disposition ascriptions. Given that one of the primary claims of my account is that dispositional behaviors constitute evidence for

the existence of an associated dispositional property, and that belief in the existence of a dispositional property motivates a prediction of the associated behaviors, an account of how it is that the behaviors can be understood as being distinct from the property, and the nature of the relationship between the behaviors and the associated property ought to be provided. The account that I provide in order to answer this potential question regarding the nature of the relationship between a dispositional property and its associated behaviors is similar in many, though not all, ways to well-known functionalist accounts of other phenomena. Ultimately, I think that while the position that I outline in this chapter is a particularly good companion to my account, my account, being metaphysically minimal, is consistent with whatever sort of plausible metaphysical account of dispositions one might endorse.

5.2 Functionalism.

Functionalism is the view that certain phenomena are to be identified by the functional roles that they play within the overall system of which they are a part. To use a common and analogous example, the functional role of pain is something along the lines of causing certain behaviors such as wincing or crying out, causing the desire to no longer be in pain, and of course having been caused by some sort of physical bodily damage. This functional role, once defined, is then identified with a physical state that is said to realize that role in a given system. In the case of pain in humans, this realizer is usually said to be some sort of neuro-physical state such as the stimulation of so-called 'c-fibers' (Smart 1959).

Malzkorn points out that '[t]he idea that functional states are realized by physical states has an analogy in the theory of dispositions, namely, the idea that every disposition has a (categorical) basis' (Malzkorn 2000, p.467). Upon this functionalist account of dispositions, the disposition is to be identified with the realizer of the relevant function role which in this case is the behavior or behaviors that it manifests in response to a certain stimulus or stimuli.

The realizer of this role is whatever physical property brings about these behaviors. The functional role of fragility, for example, is roughly breaking upon being struck. The realizer of this role is whatever physical property is responsible for these behaviors, and it is this property that is to be identified with the dispositional property of fragility. Fragile objects tend to break when struck and they are generally either made from a fragile material or constructed in a fragile manner. The physical property of the material from which an object is constructed, or perhaps the manner of its construction, is the property of fragility for this particular object.

Behaviorism, as discussed in chapter 2, and functionalism share some similarities. The clear similarity is that mental and dispositional states are still, at least partly, understood in terms of their behaviors. At least *part* of what it is to be in pain is to exhibit behaviors associated with pain – crying out, holding an injured body part, and so on. So it is with physical dispositions. At last *part* of what it is to be fragile is to manifest some sort of breaking type behavior in response to some sort of striking type behavior.

5.3 The general approach to a functional analysis of dispositions.

I will now explore a way in which a functionalist approach could be taken towards the suppositional account of dispositions that I provided in the previous chapter. While I believe that the variety of functionalism discussed in this chapter is a good companion to my suppositional account, I acknowledge that there are likely other ways in which my suppositional account can be built upon, or other metaphysics that are consistent with it.

According to a functional account of mental states, a mental state is to be identified with a causal role, or the functional role it plays within the overall mental or behavioral system. As such, many of the theoretical terms concerning mental states are the deliverances of folk psychology (Jackson 1998, Jackson and Pettit 1990a). In collecting the platitudes that we associate with a certain mental state, such as being in pain, we need only look to our folk psychological understanding of pain. Pain is roughly whatever fills the functional that role folk psychology tells us pain plays. Again, this role tends to be defined by observables such as behaviors like moaning, and holding an injured body part, as well as unobservables such as the belief that the pain is being caused by damage, and the desire to no longer be in pain.

I suggest that our understanding of dispositions and their associated behaviors is a sort of folk physics that can be thought of as being analogous to our folk psychological understanding of mental states. Just as we can understand mental states in terms of the functional role that they play, we can understand dispositions in terms of the functional role that they play.

A functional account of a disposition will begin by defining a functional role for a dispositional term. As stated above, this will be largely derived from our folk understanding of these dispositional concepts. For example, the functional role of the sort of fragility possessed by a glass is something like breaking, cracking, chipping, smashing, shattering - and any other similar verbs that might be associated with fragility - in response to being dropped, struck, shaken and so on.

I will then argue that a functionalist approach addresses many of the problems generated by a behaviorist approach, while retaining many, if not all, of the intuitively attractive features of behaviorism. I will set out my view by following what has been called the 'Canberra Plan' approach as outlined by Lewis (1970, 1972) [65]; however, I will also flag the ways in which my account of dispositional properties is something of a hybrid between this approach and the empirical functionalist approaches associated with other philosophers of mind such as William Lycan (1996)

A Canberra Plan approach to the analysis of some concept involves two parts or stages; an *a priori*, analytical stage and an *a posteriori*, synthetic or empirical stage (Lewis 1970, p.427). In following Lewis (1970, p.428) we can regard the ordinary platitudes that

[65] While my use of the 'Canberra Plan' approach is mostly due to Lewis's treatment, it is famously championed by Jackson (1994, 1998). Braddon-Mitchell and Nola (2009) point out that the earliest published use of the term 'Canberra Plan' was by O'Leary-Hawthorne and Price who comment that 'Some of the programme's advocates have taken up an ironic suggestion we made in an earlier version of the present paper, and now call it "the Canberra Plan"' (1996, p.291).

competent language users accept concerning a dispositional property as a theory that picks out the property in question. We do this by collecting up the claims that are regarded as platitudes concerning the property (Lewis 1970, p.428). In the case of dispositional properties, these platitudinous claims will be of the following kinds:

1) Claims of the kinds that we most quickly move to in discussing the intuitions behind analyses of dispositions. In the case of fragility, for instance, we generally agree that[66]:

    (a) ordinarily,[67] fragile things will break when struck;

    (b) ordinarily, fragile things will crack when dropped;

    (c) ordinarily, fragile things shatter when squeezed; and so on.

These are the kinds of agreed points about fragility that very naturally motivate a conditional analysis. As I have argued, we needn't interpret them as evidence for a truth-conditional account along the lines of the simple conditional analysis; they could equally

[66] Following Malzkorn (2000, p.468), I will adopt the view that 'every disposition D corresponds either to a test-manifestation pair $<T,R>$ or to a particular class $\{<T_1,R_1>,<T_2,R_2>, \ldots\}$ of such pairs each of whose elements plays a particular role for D'. This language is consistent with my inferential claim that the existence of some dispositional property D can be 'tested for' by observation of what Malzkorn calls a 'test manifestation pair' of S and M.

[67] The nature of this 'ordinarily' condition, and the role it plays in my account, and others, is discussed in the following chapter.

serve to register our epistemic practices in attributing dispositional properties and making predictions concerning them, along the lines of my suggested suppositional alternative.

2) Claims about exemplars and foils of the relevant dispositional property; the kinds of ordinary examples that might be used to make sure another person understands what the dispositional property involves. For instance, in the case of fragility we might agree that:

    (a) crystal vases and uncooked eggs are paradigmatically fragile things;

    (b) things like those in (a) above (in the relevant ways) are fragile;

    (c) rubber balls and lumps of earth are things that are paradigmatically not fragile;

    (d) things like those in (c) above (in the relevant ways) are not fragile.

It may well be that no set of exemplars and foils is completely common across all of us (your knowledge of supercooled objects may give you exemplars of fragility that I don't possess) but sufficiently many overlapping sets of examples among us will do the job for many dispositional properties (Lewis 1997). As Lewis points out in discussing the extension of the folk theory method to colour terms, as long as our judgments of relevant similarity (of the kinds in (b) and (d) above) are picking out sufficiently similar sets of things, we might not even need overlap between the cases of (a) and (c) we each accept, and that for each of us generate the relevant sets of objects in (b) and (d) in actual practice.

3) Claims about the physical properties that in some sense underlie claims of kind (1) above. For example, in the case of fragility we might agree that:

a) ordinarily, fragile things like vases are so in virtue of having a particular physical microstructure;
b) ordinarily, fragile things like houses of cards are so in virtue of having a precarious manner of construction.

Here also our 'folk theory' of fragility is likely to contain more complexities. Some applications of the term (as in discussing psychological states, for instance) might seem metaphorical to some of us; if we agreed that talk of a 'fragile personality' was to be construed literally, we might expect to see the difference between such cases and cases of vases, houses of cards and so on to be mirrored in a further claim here about the separate way that personalities can be fragile.

Claims of the above types collectively exemplify our understanding of the relevant dispositional concept. Unlike the folk psychological case that serves as the obvious analogy, plausibly there will be many such theories – a separate theory of this kind for each set of dispositional terms the platitudes for which are mutually implicatory. The folk theories of fragility and solubility might well not overlap in any way, while those of fragility and durability might well make reference to both properties, if only as near-antonyms.

Lewis takes a folk theory to deliver the meaning of the relevant term; by contrast, my view here is that this is a reference-fixing practice. Just as empirical functionalists about the mind can regard our folk psychology as allowing us to determine what states might be beliefs without regarding their folk psychological role as of the essence of being a

belief, I take our folk dispositional claims as allowing us to competently fix on dispositional properties in the world without delivering the essence of, say, fragility.

Let D be the conjunction of these claims for some disposition, each expressed in property name form – that is, the references to the relevant disposition are grammatically always appearing as terms (Lewis 1970, p.429). Each distinctively dispositional property term is then replaced by a different variable, giving the string $D(x_1, \ldots x_n)$ (Lewis 1970, p.430). (As noted above, there might be not so many distinct property terms being replaced in this way – this is not a single folk theory but a separate process for each cluster of dispositional properties involving co-referential platitudes.) We can then construct the Ramsey sentence by prefixing an existential quantifier for each free variable: $(\exists x_1)\ldots(\exists x_n)D(x_1, \ldots x_n)$. This existential claim can be understood as expressing our commitments that allow us to fix the reference of the relevant dispositional concept. Lewis goes on to generate definitions of the relevant Ramsified properties by using the Ramsey sentence; as I noted above, I will not follow him in this.

I now follow Lewis in the second stage, in identifying the realizer state, not the role state, as the property. Upon this sort of approach, the realizer is a token property (in virtue of which the thing plays the role), and the collection of these token properties are as a whole (ordinarily) of the type fragility [68].

[68] See Churchland (2005, pp.38-43) for a similar approach.

The Ramsey sentence above could be expressed informally as something like: 'there exists something such that it has such and such features and behaves thus and so'. The Ramsay sentence is not purely analytic; it makes an existential, ontological claim about a physical property or properties.

Having made an existential claim, the second, synthetic or empirical stage of this Canberra Plan style approach is to then to identify what, if anything satisfies the ontological claim made by the Ramsay sentence. If such a thing exists, then the Ramsey sentence is true. If not, it is false [69].

That is, having made the claim that there is a certain thing that has such and such features and behaves thus and so, the task becomes one of conducting some sort of *empirical* investigation in order to identify this thing, if indeed it exists. The Canberra Plan approach is, therefore, to be distinguished from *purely* analytic forms of functionalism. The approach is analytic insofar as it allows for *meanings* to be fixed by roles, but is empirical insofar as it defers to empirical disciplines, such as the physical sciences, in order to learn whether or not the *thing to which the Ramsay sentence fixes the reference* of our relevant concepts, actually exists.

The second stage of the Canberra Plan approach to functional analysis of dispositions would involve using a preferred approach to empirical, *a posteriori* investigation in order to ascertain whether or not the thing captured by the Ramsay sentence exists. To use a

[69] Lewis (1997 p.326) allows for cases that are not straightforwardly true or false, but are 'near enough'.

common sense example, suppose we state that hearts are the sorts of things that are involved in the pumping of blood around the body of some living organism. An existential quantifier is attached to this claim yielding the claim that these things do indeed exist. The second, *a posteriori* stage of the Canberra plan approach would have us carry out some *empirical* physiological or biological type investigation in order to discover whether or not such things as these actually exist. If they do exist, then the Ramsay sentence is true. If they do not exist, then the Ramsay sentence is false. To continue with the fragility example, and to continue to use Malzkorn's highly appropriate characterization of a stimulus and manifestation conditions as being a test-manifestation pair, in following the second stage of the Canberra Plan approach, objects are tested by being struck. If a tested object also breaks, then that object might reasonably be believed to be fragile.

5.4 The roles of dispositions.

Malzkorn's characterization of the stimulus, manifestation pair as a *test*, manifestation pair is important and, I think, underappreciated. It makes explicit the empirical and epistemic nature of disposition ascriptions that I argued for in the preceding chapter. The functional roles that dispositions play in our understanding of the physical realm have this character. Dispositions are generally characterized in terms of certain behaviors, which I have argued play certain functional roles, but the relationships that these roles have to each other and to their realizer or realizers have both an empirical and an epistemic character that is usually not discussed

Malzkorn argues that 'a dispositional concept can be defined in terms of conditionals whose antecedents refer to a particular test and whose consequents refer to a particular manifestation' (2000 p.453). According to this sort of understanding, the events that we associate with dispositions provide us with various epistemic resources. The actual manifestation of a disposition in response to its associated stimulus does not *constitute* the existence of the dispositional property. Martin's mimicking type counterexamples illustrate this point. Rather, as I argued in the previous chapter, the manifestation of some disposition following a stimulus condition (or to use Malzkorn's term, the 'test' condition) provides *evidence* for the existence of the causal basis of that disposition. To use a practical example, we might *test* for the existence of a certain disposition such as elasticity of a ball, by stimulating that disposition - by dropping the ball - and seeing if it manifests the associated behavior - by bouncing. If indeed the ball does bounce upon being dropped, the test has provided evidence for the existence of the causal basis of elasticity. Evidence can, of course, be misleading. Martin's mimicking type scenarios are examples of cases in which evidence has been misleading.

This claim that observable behaviors provide evidence for the existence of some unobservable dispositional property can be extended to the other direction of epistemic relation between a causal basis of some disposition and the behaviors that we associate with that disposition. Belief in the existence of a disposition provides us with the means of making predictions. The actual existence of the disposition, in addition to whatever extra knowledge is had of the causal system at play, will account in part for the accuracy of the prediction. The belief that a die has six sides combined with the belief that it is equally weighted and so on licenses the prediction there is a 1/6 chance of the die

producing a certain result, or that upon a long run of throws, the values will be roughly equal. Likewise, belief that a glass is fragile licenses the prediction that the glass will shatter when struck.

Of course a mistaken belief in the fragility of the glass may render the prediction inaccurate. Such a case is consistent with mimicking type counterexamples. That is, the glass may not actually possess the causal basis of fragility. Because it does not possess the causal basis of fragility, a prediction that the glass will break when stuck will unlikely to be accurate.

If we are mistaken in our prediction that the glass will break when struck, then this seems like good evidence for the non-existence of the dispositional property that we had thought to exist and would constitute good grounds for potential belief revision. Indeed if I were to attend a picnic lunch and knock from a table a glass that I believed to be fragile and were that glass to fail to break, I might revise my belief that the glass was fragile and perhaps come to believe that the glass was in fact made from a durable plastic or the like.

This view is also consistent with my previous claim that a disposition can provide grounds for e*xplanation* of the behaviors that are associated with that disposition. If someone were to observe the breaking of a glass and ask 'why did that glass break?', the breaking of the glass might be explained in terms of its being fragile where 'being fragile' refers not to the behaviors but to the causal basis of those behaviors. That is, certain roles can be explained in terms of their realizers.

As such, I propose that in addition to the behaviors that we associate with dispositions, the *epistemic* roles that a dispositional concept plays in our understanding of that disposition are included amongst its functional roles. To properly understand the functional role of a disposition is not just to understand the *behaviors* that are associated with the disposition but also the *epistemic roles* that those behaviors play in our understanding of dispositional concepts. That is, the functional role of some disposition is not just the stimulus, manifestation pair but is *also* the evidentiary role, the predictive role, and the explanatory role of that dispositional concept, and that these are to be included amongst the collection of platitudes concerning the disposition.

5.5 The realizers of dispositions.

Upon a functionalist account of dispositions, disposition ascriptions are to be understood in terms of the functional roles that they play, rather as straightforward behaviors. These functional roles are realized by some physical state or property. If indeed the functional role is realized by something, then the associated disposition ascription is true. If it is not realized, then the disposition ascription is false. But what is the disposition itself? Is it the role, or is it the realizer? The result of my arguments above is that the dispositional property is to be identified with its realizer.

There is a distinction to be made between the roles that things play and the things that play the roles. Returning to the frightened actor example, which was used in Chapter 2, is a simple way to illustrate this. The *actor* is the thing playing the role of a person in the state of fright. The *person in the state of fright* is the role being played by the actor.

Pain is often used as the stock example of how functional roles can be realized, so I will follow this convention. The functional role of pain is the production of certain behaviors like moaning, and holding injured body parts, and certain other internal states such as the desire to no longer be in pain. Pain, however is physically realized, somehow. In the example above, I mention an injured body part. This injury might bring about a certain physiological state that produces the behaviors typically associated with pain. A simplistic - but sufficient for the purpose of this discussion - example of this might be that the injury causes the firing of certain pain receptors which might be called 'c-fibers'. So, while pain has the functional role that is outlined above, it also has a physical realizer; the firing of c-fibers.

The same can be said of dispositions. Part of the functional role of fragility is something like breaking when struck. As mentioned above, an object might be fragile for any number of reasons. The fragility of a glass, for example, might be due to its microstructural properties. The microstructural property of the fragile glass is the realizer of its fragility. Couched in terms of the suppositional account provided in the previous chapter, this amounts to the claim that D represents the realizer of a disposition and that S, M, and whatever relationship holds between them represents part of the functional role of a disposition.

This claim obviously relies upon the assumption that physical dispositions *have* realizers. This assumption is not entirely innocent. As such, I treat this claim in the most neutral way possible. Little of the positive argument that I attempted to establish in the preceding

chapters of this thesis depends crucially upon the nature of the realizer but I do assume that there is one. It matters little what it is, just that there is for each physical disposition a realizer of the relevant functional role.

5.6 Roles vs realizers.

I will argue for the position that I will refer to as realizer identity.

(Realizer identity) A disposition is identical to its realizer.

This is to be contrasted with what I will refer to as the role identity claim.

(Role identity) A disposition is identical to its role.

In order to soundly establish realizer identity, two claims need to be established. First, the disposition is not, or perhaps cannot be, identical to its role. This is to reject role identity. Second, it is possible for a disposition to be identical to its realizer. The rejection of role identity is not sufficient to establish realizer identity if realizer identity is not available as a genuine option. Moreover, establishing that realizer identity is available as a genuine option is not sufficient for the adoption of realizer identity unless it can also be shown that role identity is not available as a genuine option. I will begin by rejecting role identity.

5.7 Rejecting role identity.

The rejection of role identity might be motivated by one of a number of overdetermination type arguments[70]. One such argument is due to Jackson and Pettit (1990b) who argue that four individually reasonable assumptions, when considered together, generate a problem for appealing to certain properties as explanans in causal explanations. The four assumptions are as follows:

1 A causal explanation must refer to a causally relevant, rather than irrelevant, property (p.108).

Assumption 1 should be fairly intuitive. If I am to explain an event by reference to the properties of the object or objects involved, the properties to which I appeal need to be causally relevant in order for the explanation to be satisfying, or genuinely explanatory. For example, my glass possesses the property of fragility *and* coincidentally the property of transparency. If I want to explain the shattering of the glass, I should do so by reference to glass's fragility and not to its transparency. The fragility is causally relevant; the transparency is not.

2 One way in which properties can be causally relevant is by being a property due to the instantiation of which, the explanandum occurs (p.108).

[70] A similar, and often cited, argument is Kim's (1989, 1998) causal exclusion argument that, like Jackson and Pettit's argument, aims to show that higher order properties cannot be causally efficacious. For a criticism of this argument see Corry (2012).

To return to the above example, the reason that I should refer to the fragility of the glass and not to its transparency is because it is due to the instantiation of fragility in that glass, that the glass broke. It is not due to the instantiation of transparency in the glass that the glass broke.

3 A property is not causally efficacious in this way if the following three conditions are jointly met (p.108):

(i) A property F is efficacious in producing the explanandum only if a distinct property G is also efficacious (p.108).

(ii) F and G are not sequential causal factors (p.108).

(iii) F and G are not co-ordinate causal factors (p.108).

In order to explicate claim 3, the following example is provided (Jackson and Pettit 1990b, pp.109-110). We are seeking to explain why a fragile glass broke upon being struck. Two potential explanations are provided. First, the glass broke because it was fragile. This explanation would presumably be accompanied by extra information such as the functional role of the term 'fragile' and the fact that the glass was struck and so on. Second, the glass broke because of its molecular structure. Again, this would presumably be accompanied by extra information such as the claim that things with this sort of molecular structure are the realizers of the functional roles. So, there are two potential properties to which I might appeal in order to explain the breaking of the glass. These are:

Realizer fragility

Role fragility

Upon this claim, both the glass's functional role and its realizer are properties. Moreover, one of these properties is efficacious only if the other is. One, according to Jackson and Pettit, cannot obtain without the other. Hence, condition (i) is met. Because these properties somehow co-obtain, they are not sequential causal factors. That is, they are not temporally separated in any way. Hence, condition (ii) is met. Finally, it is not the case that the two properties somehow combined in order to produce the effect. Hence, condition (iii) is met. Because conditions (i), (ii) and (iii) are met in this case, fragility cannot be said to be causally efficacious in the breaking of the glass.

This is a problem because:

4 The only way a property can be causally relevant, thus suitable for use as an explanans, is by being causally efficacious in the production of the associated explanandum (p.111).

So, by the above argument, fragility cannot be appealed to in an explanation of the breaking of the glass.

What I propose here is to reject the claim that the functional role of some disposition is a property and appeal instead to the realizer of that role. Appealing to the realizer and rejecting the claim that the role is a property, means that the conditions of claim 3 are not

jointly met. Because the conditions of claim 3 are not jointly met, the realizer can be understood as being causally efficacious in producing the behaviors with which it is associated. In other words, the functional role of fragility is not the property of fragility. The property of fragility is to be identified with the realizer of that functional role which, in the case of the sort fragility that is ascribed to things like glasses, is a certain microstructural property.

My point here is that, as argued above, the functional role of fragility is, at least in part, the stimulus and manifestation behaviors. Given that the functional role of a disposition is, at least in part, its stimulus and manifestation behaviors, the functional role cannot explain the stimulus and manifestation behaviors. In order for the behaviors associated with a disposition to be explained, something more than the functional role is required. The thing that can be appealed to as a basis for the explanation of these behaviors is the realizer of that disposition.

5.8 Adopting realizer identity.

In order to demonstrate that dispositions do have realizers, and that the disposition is to be identified with the realizer and not the role, I will first provide a brief overview of the types of dispositional property stand as potential realizers.

To begin, recall the Pure Dispositions Thesis, which states that some dispositions are not grounded by a causal base that is non-dispositional. One might claim that dispositions may indeed be grounded, but might be grounded by either, distinct *further* dispositions

or may indeed be self-grounded[71]. That is, upon a sort of Pure Dispositions Thesis there may higher-order and lower-order dispositional properties. Macro level dispositions might, for example, be grounded by or supervene upon micro level, perhaps more fundamental, dispositions. A pure disposition may not, however, be grounded by a categorical property.

This is subtly, but importantly, different from the claim that dispositions have no *distinct* causal basis. Upon such an account, a pure disposition would be either ungrounded, or it would be self-grounded. Bauer (2012) and McKitrick (2003) take this sort of view. The dispositional nature of such a property exhausts the existence of that property and nothing more is to be said about it. In other words, if one were to provide a complete account of such a property, one would do so entirely in terms of stimulus and manifestation conditions. An ungrounded or self-grounded disposition is an exemplar of a pure disposition.

Upon both of these claims, the dispositional features of some disposition ultimately account for its existence. It may be grounded, and indeed it may be grounded by some further dispositional property with which it is not identical, but ultimately, the disposition, or its base if grounded by a lower order disposition, remains entirely dispositional.

The Pure Dispositions Thesis is not to be conflated with the very closely related claim of dispositional monism. In order to be clear about the nature of dispositional monism, the

[71] Choi and Fara (2014) point out that self-grounded dispositions are necessarily identical to their base, in which case they are ungrounded.

Pure Dispositions Thesis, and their differences, I will rely upon a tripartite distinction made by Bird (2009, p.3). Bird outlines three positions one might take towards the modal ontology of properties.

The first of these three positions is categorical monism. Categorical monism is the claim that only categorical properties exist. Categorical properties have no modal character. They are modally inert and merely categorize or, to again borrow from Ellis and Lierse (1994, p.28), characterise their possessors. Orthodox examples of categorical properties are things like spatiotemporal relations, and geometrical shape (Ellis and Lierse 1994 .p.28)[72]. Triangularity is a good example of this (Mellor 1974)[73]. If you were to tell me about what it is for something to be triangular, you would presumably do so, or at least be able to do so, without reference to behaviors, actual or otherwise[74].

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[72] While geometrical shape is often cited as an orthodox *example* of a categorical property, there is substantial disagreement as to whether or not it, or any other purportedly categorical property, is indeed categorical. See my previous footnote on the debate between Mellor and Prior.

[73] I should point out that Mellor (1974) does not claim that triangularity is an example of a categorical property.

[74] Arguably the most prominent example of a categorical monist is Armstrong. See Armstrong (2012) for a recent defense of categorical monism. Armstrong's (1983) is an extended account of a sort of neo-Humean view of the laws of nature that is in direct contrast to the dispositional view of Bird (2001, 2005a, 2005b, 2009) and others such as Bostock (2003). The categorical view is discussed and defended throughout Armstrong, Martin, and Place (1996).

The second of these positions, and in direct contrast to categorical monism, is dispositional monism. Dispositional monism is the claim that only dispositional properties exist. Dispositional properties, unlike categorical properties, are not modally inert and are in fact entirely characterized in terms of their modal character. By 'modal character' I mean behaviors under certain, possibly non-actual, conditions. A common example is fragility. If you were to tell me about what it is for something to be fragile, you would presumably do so in terms of behaviors. These behaviors might be actual – 'the fragile glass was dropped and it broke' - or they might be merely potential – 'the fragile glass, if dropped, will break' [75].

The third of the positions outlined by Bird is what he calls the 'mixed view'. The mixed view is the view that both categorical and dispositional properties exist. An adherent to the mixed view might, for example, state that triangularity is a genuine example of a categorical property, that fragility is a genuine example of a dispositional property, and

[75] Bird is himself a dispositional monist. See Bird (2012) for a recent defense of dispositional monism and his 2009 for an extended treatment of the view and its relationship with the laws of nature. Mumford (1996, 1998, 2004) and Mumford and Anjum (2011) seem to take this view. Mumford (1996, p.87) has argued that dispositional properties and categorical properties are not distinct insofar as 'categorical' really just means 'actual' and dispositions are as actual as any other properties, even if their manifestations may not be.

that both properties exist[76]. Included in this category are also those who adopt a position stating that certain properties have both dispositional and categorical elements[77].

Dispositional monism and the Pure Dispositions Thesis, while mutually consistent, are not identical. Dispositional monism entails the Pure Dispositions Thesis as I have characterized it, but the converse does not hold[78]. The Pure Dispositions Thesis is consistent with what Bird has called the 'mixed view'. Someone who adheres to the existence of categorical properties might also adhere to a Pure Dispositions Thesis. He or she will simply make the extra claim that pure dispositional properties, and categorical

[76] See Ellis (2012) for a recent defense of his version of a mixed view. Molnar (2009, p.181) also adopts a mixed view in stating that 'our world is one in which both [powers and non-powers] are amply instantiated. Pan-dispositionalism is not impossible but it *is* false'.

[77] Martin (1997) seems to take this sort of view. He states 'It is my suggestion that the properties of entities that are constitutive of any state of affairs must be qualitative as well as dispositional, and dispositional as well as qualitative' and that 'The only way this can be expressed is by claiming that the qualitative and dispositional are identical with one another and with the unitary intrinsic property itself (1997, pp.215-216).

[78] Stronger versions of a Pure Dispositions Thesis are not necessarily entailed by dispositional monism. There may be a strong version of a Pure Dispositions Thesis that states that *all* dispositions are ungrounded or self-grounded. Someone might accept dispositional monism without accepting this stronger version of a Pure Dispositions Thesis. For example, such a person might adopt the view that there are only dispositional properties but might adopt the further view that at least some dispositional properties are grounded by *further* dispositional properties.

properties are distinct and that there is not necessarily any grounding or supervenience relationship between them.

Several reasons have been given for adopting a Pure Dispositions Thesis. A powerful example is what Mumford (2006), calls 'The Ungrounded Argument'. Mumford expresses the argument as follows (2006, p.479):

1. 'There are subatomic particles that are simple.'
2. 'That which is simple has no lower-level components or properties.'
3. 'The properties of subatomic particles are (all) dispositional.'
4. 'The grounds of a dispositional property can be found only among the lower-level components or properties of that of which it is a property.'
5. Therefore, '[t]he dispositional properties of subatomic particles have no ground.'
6. Therefore '[t]here exist some ungrounded dispositions.'

The claim in (1) that 'there are subatomic particles that are simple' is made in accordance with current best science (Mumford 2006, p.472). Certain fermions and bosons are examples of apparently simple subatomic particles. Claim (2), that 'that which is simple has no lower-level components or properties' follows analytically from the meaning of what it is for something to be simple (Mumford 2006, p.473). Claims (1) and (2) imply the factual claim that science takes seriously the notion of fundamental physical properties that are indivisible or have no 'lower levels' of existence.

Claim (3) moves from the nature of subatomic particles to nature of the properties that they possess. Claim (3), like claim (1), is also made in accordance with best current science, and is a common claim in the philosophical literature. Mass, spin, and charge are often cited as examples of the irreducibly dispositional nature of certain fundamental physical properties (Molnar 2009, Ellis & Lierse 1994, Blackburn 1990, McKitrick 2003).

Claim (4) makes a stricter claim than that of the Pure Dispositions Thesis as I have characterized it above. I stated that for the purpose of this discussion, a disposition that is self-grounded counts as a pure disposition. I make no claim as to whether or not this self-grounding needs to be at a lower level or otherwise. In stating that 'something is ungrounded if and only if it has no grounds in anything other than itself [and that a] property that is only self- grounded can count as ungrounded', Mumford (2006, p.477) makes a similar claim. Claim (4) in stating that '[t]he grounds of a dispositional property can be found *only* among the lower-level components or properties of that of which it is a property' (my emphasis) goes a little further. According to claim (4), cases of macro level dispositions, such as fragility, cannot count as self-grounded. For Mumford, macro level dispositions may very well count as genuine dispositions, but must be grounded by more fundamental dispositions.

If indeed it is the case that grounds can only be found at lower levels, and that subatomic particles are both simple and dispositional, it follows that, as stated in claim (5) 'dispositional properties of subatomic particles have no ground'. That is, the dispositional properties, such as mass, charge, and spin, of the subatomic particles, count as pure

dispositions. Given that 'dispositional properties of subatomic particles have no ground' *and* that subatomic particles can reasonably be said to *exist*, the existential claim made in the conclusion (6), that 'there exist some ungrounded dispositions' follows.

A problem for the Pure Dispositions Thesis is that, as Bird (2006, p.491) puts it, dispositions are sometimes said by categoricalists to possess 'too much potentiality' and 'too little actuality'. That is, dispositions are characterized as producing a certain manifestation behavior in response to a certain stimulus event. This manifestation may never be manifested. A fragile glass might break if struck but it may never be struck and may never break. Its breaking upon being struck is merely potential. As such, according to the categoricalist, only categorical properties are suitable realizers.

One strategy that might be employed to avoid this problem is to deny that there is any meaningful distinction to be made between the categorical and the dispositional. Mumford (1996, p.86) argues that '"categorical" is seriously misleading as a contrast with 'dispositional'. "Categorical" just means "actual"'. In response to the claim that dispositions possess too much potentiality due to the manifestation of a disposition being merely potential, rather than actual, Mumford (1996, p.87) goes on to point out that 'it is for this reason that we must be at pains to emphasize the distinction between a disposition and its manifestation. It is the manifestations of dispositions that are to be considered *possibilia*; not the dispositions themselves, which are *actual*'[79]. For example, the breaking

[79] Goodman takes a similar view and states that 'dispositional and manifest predicates are labels used in classifying *actual* things (1983, p.49).

of a fragile glass is *possibilia*. The fragility of the glass, however, which is to be identified with its realizer, is actual.

Given that role identity has been rejected and that it has been demonstrated that realizer identity is available as a genuine alternative, I conclude that realizer identity ought to be adopted. That is, dispositional properties are identical to their functional realizers; dispositional behaviors are identical to their functional roles.

5.9 Multiple realizability.

It is also important to note that functionalism allows for functional roles to be multiply realized. This is not a problem for the account that I have proposed. A glass, for example might be fragile because glass tends to be a fragile material with which to construct things. A house of cards might be considered fragile not because cards are necessarily fragile materials, but because the structure was put together in a precarious fashion. Both house of cards and the glass possess the functional *role* of fragility inasmuch as they will both break, in some fashion, when struck. The *realizer* of that role, however, is different in the case of the glass and the house of cards.

Being sensitive to the important distinction between roles and realizers means that we can allow that the same functional role can be realized by any number of realizers. Any number of actors could be employed to play the role of a certain character. Lack of sensitivity to this distinction can easily generate errors. For example, we might say the frightened *character* has brown hair. This may very well be true. It might be specified in

the script that the frightened character does indeed have brown hair. However, this is not necessarily true of the realizer of the role. The actor, who plays the character might be a person with blonde hair who is wearing a wig for the purpose of playing the brown haired character. Something can be true of a role without being true of the realizer of that role.

If we accept that the realizer of pain in humans is something along the lines of c-fibers firing, we might imagine a scenario in which a non-human organism can also be in a state that plays the functional role of pain even though their pain is differently realized. Perhaps this organism does not possess c-fibers. The physiology of this organism is sufficiently different from ours that they do not possess c-fibers, and yet they still experience pain (Lewis 1983, pp.122-123).

The same can be said of dispositions. Certain functional roles might be differently realized. Table salt and sugar appear very similar. They also possess the apparently very similar disposition of solubility. If placed in water, they will both dissolve. But salt and sugar, despite appearing similar when served at table and despite appearing to both exhibit the same disposition, exhibit the behaviors associated with that disposition in very different *ways*. What is being observed when we observe the dissolution of these substances when placed in water are two very different chemical processes, brought about by two very different realizers. Salts are soluble in virtue of being ionic compounds while sugar molecules are soluble in virtue of being comprised of covalently bonded atoms[80].

[80] For a more informative description of the nature of the solubility of salt, and of the interesting consequence that it holds for the modal character of the laws of nature, see Bird (2001).

So, when we observe salt dissolving in water, we are observing a certain chemical process; the chemical process associated with solubility in virtue of being an ionic compound. When we observe sugar dissolving in water we are observing a *different* chemical process; the chemical process associated with solubility in virtue of being comprised of covalently bonded atoms. The dissolution of these substances when placed in water is a very superficial observation of their behaviors. That is, there is more to the functional role of solubility than the very superficial behaviors of disappearing when placed in a solvent. What I am suggesting here is that in the case of table salt and sugar, there are in fact two very different dispositions at work. For lack of better terms these are: ionic compound solubility, and covalent bond solubility. We call these both 'solubility' because their behaviors upon the same stimulus are superficially similar, even though they are in fact very different, both in terms of their realizers, and the manner in which they present their superficially similar behaviors.

This is not dissimilar to Churchland's (2005) claims regarding multiple realization. Churchland (2005, pp.39-40) argues that sound can be realized in a number of distinct ways; in the Earth's atmosphere, in a gas, in a liquid, or in a solid. Despite being multiply realized in these distinct media, all of these are token examples of the type '*sound*'. This parallels my claim that despite being multiply realized by distinct chemistry, salt-solubility and sugar-solubility, are both tokens of the type '*solubility*'.

I might be criticized at this point for reasoning in error[81]. That is, I have claimed that salt and sugar are both soluble. I have also claimed that dispositions are identical to their realizers. This being the case, it should not be possible for solubility, or indeed any disposition, to be multiply realizable. I respond in two ways:

First, salt and sugar are both soluble only upon a very superficial interpretation of 'soluble'. Again, both disappear when placed in water, but the chemical process that is being observed, even though it is not noticed by the naked eye, is different in each of these cases. As such, while they both exhibit the behavior of disappearing when placed in water, they exhibit very different behaviors below that superficial level.

Second, I identify the functional role with the dispositional *behaviors* and the functional realizer with the dispositional *property*. I do *not* identify behaviors with properties. This is a good example of a way in which disposition ascriptions can generate errors. To return to the solubility example, to what am I referring when I say of a thing that it is soluble? Am I referring to the behaviors? Am I referring to the processes by which it exhibits those behaviors? Am I referring to the property which brings about those (different) processes and (similar) behaviors? My answer: yes. And herein lies a source of general confusion regarding dispositions. In common speech we tend to use the term interchangeably. That is, we may mistakenly use the same term to refer to very different types of thing, thus generating confusion and errors in reasoning.

[81] I thank an anonymous examiner of a previous version of this thesis for pointing this out.

5.10 Summary.

I suggest that the sort of functionalism about dispositions that I have outlined in this chapter is a good companion to the suppositional account of dispositions that I have attempted to establish in this thesis. I maintain, however, that one could accept my suppositional account of dispositions without committing to the sort of functionalism outlined here, or indeed any sort of functionalism at all. The only metaphysical claim made by my suppositional account is that the behaviors that we associate with a disposition constitute evidence for the existence of a dispositional property, and that belief in a dispositional property motivates predictions concerning behaviors. Ultimately, whatever kind of thing the dispositional property is, my suppositional account should accommodate it.

There are a number of relevant parallels between the functionalism outlined in this chapter and my suppositional account that make this sort of functionalism a good companion. Primarily, the separation of roles and realizers parallels my separation of behaviors and the properties with which they are associated.

6 Normal Conditions.

6.1 Introduction.

So far I have provided an account of the apparent conditionality of dispositions in terms that avoids the use of counterfactual conditionals, or any other truth-conditional conditionals. A very important feature of dispositions and their relationship with counterfactual conditionals has, however, been largely avoided thus far. Common use of disposition language and concepts often involves appeal, either implicit or explicit, to some sort of 'normal conditions' under which a disposition might manifest its behavior in response an associated stimulus. Discussion of these normal conditions has so far not been a feature of my account. As a result, a potential criticism might be raised against my account.

For this sort of reason, my account might be objected to as follows: 'The positive account given so far may explain away some of the intuitive evidence that we would ordinarily take to support a conditional analysis of dispositional properties in terms of (truth conditional) counterfactuals, but it doesn't explain all of it. In particular, wherever we find ourselves needing to appeal to 'normal conditions' or the like to present a *plausible* philosophical analysis, we have good reason to think that our analysis involves proper counterfactual conditionals [82]. The need to appeal to normal conditions is a marker

[82] Consider Lewis's (1979, 2000) analysis of causation, Nozick's (1981) tracking analysis of knowledge, and so on.

of the sensitivity of something like the Lewis-Stalnaker account of the semantics of counterfactuals to judgements of relevant similarity. But we find exactly this kind of sensitivity present in the case of apparently conditional claims involving dispositions as well: we think that a glass is fragile if it would break if struck sharply *under normal conditions,* such as the absence of finking conditions. As such, by avoiding counterfactuals, this sensitivity to normal conditions, which is to be considered a desirable feature of an account involving counterfactuals, is lost."

Even if I avoid the problems associated with counterfactual conditionals, and their associated metaphysical costs, there are potential alternative accounts of the apparent conditionality of dispositions already available. One such alternative is Michael Fara's (2005) account in terms of 'habituals'.

This chapter, therefore, has two primary goals. The first is to align my account with the relevant literature on 'normal conditions' as they apply to dispositions. The second, which is closely related to the first, is to describe how my account handles the 'normal conditions' aspect of the conditionality of dispositions while avoiding the possible world semantics of counterfactual conditionals, and the sorts of metaphysical commitments that are entailed by counterfactuals. Addressing these potential criticisms provides an opportunity to better articulate my suppositional account. Essentially it will be argued that the normal conditions are to be included in the antecedent suppositions of the relevant inferences described in Chapter 3. These normal conditions are a part of our common, or folk, understanding of dispositions that, as discussed in the previous chapter, help fix the reference of dispositional concepts.

6.2 Fara and 'Funny conditionals'.

Fara (2005) advances an account of dispositions that avoids the use of counterfactual conditionals but explicitly involves sensitivity to considerations of normal conditions.

Fara's habitual account of dispositions states that '"*N* is disposed to *M* when *C*" is true iff *N* has an intrinsic property in virtue of which it *M*s when *C*' (2005, p.70). Fara also states that 'habituals have something to do with what is *normally*, or *typically*, or *generally* the case' (2005, p.64). For example, the claim that 'Mary smokes when she gets home from work' means something like 'Mary normally smokes when she gets home from work' (Fara 2005, p.64).

Fara (2005, p.56) points out that a potential strategy for solving or avoiding counterexamples to the conditional analyses of dispositions is to deny the claim *modus ponens* is a truth-preserving rule of inference for the conditionals used such analyses. This is somewhat similar to the strategy that I have employed in this thesis insofar as *modus ponens* is not a truth-preserving rule of inference for suppositionals.

Fara argues that the strategy of employing what he calls 'funny conditionals' is unsound (2005, pp. 55-59). I will provide my reasons for finding the position that I have advanced in this thesis to be a plausible alternative to Fara's.

Fara identifies two ways in which one might deny the claim that *modus ponens* is a truth-preserving rule of inference for the conditionals used in conditional analyses of dispositions; a bold way and a cautious way (2005, p.56). The main distinction between the bold and cautious ways seems to be that the bold way would be to show 'that the failure of modus ponens for counterfactuals is a quite general occurrence' while the cautious way replaces specifically the conditionals in the Simple Conditional Analysis with 'conditionals of a special kind, conditionals for which modus ponens is not valid' (2005, p.56) [83].

The bold way and the cautious way might be reinterpreted as being the *general* way and the *specific* way. The approach that I have taken in this thesis is consistent with the cautious, or specific way. As such, it is on defending this specific approach that I will concentrate. Whether or not the bolder, more general, claim can be defended is an interesting topic but not one which I attempt to address here [84].

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[83] At this point I should reiterate that my approach has not been to simply replace the conditionals in the Simple Conditional Analysis with suppositionals. As discussed in Chapter 3, such an approach would be subject to problems associated with nested suppositionals and would ultimately be nonsensical.

[84] Making the bolder claim is similar to Edgington's (1986) project. Towards the end of her (1986, p.29), she states that 'there is much that needs to be re-examined in the light of this thesis' and suggests that analyses of dispositional properties are among these things. This re-examination of the analyses of dispositions in light of Edgington's

Fara immediately rejects the bold way as being 'too bold' (2005, p.56). He states that 'it would not be enough just to produce some isolated case in which a counterfactual conditional and its antecedent are true while its consequent is false' (2005, p.56) [85]. Rather, one would need to show that this is a 'general occurrence' (2005, p.56).

The counterexample to the Simple Conditional Analysis, however, constitute an example of the way in which a claim that *modus ponens* fails as a truth-preserving rule of inference in the cautious, or specific way. To use a slightly different example to Fara's, and to limit my discussion to specific, or cautious way, one would have to show only that the conditional 'if the glass were struck, it would break' can be true even when the glass is struck and does not break.

This is where my account primarily differs from Fara's. My goal is *not* to show that this conditional can be *true*[86]. I have argued in previous chapters that attempting to show that it is or can be true is a mistake. My goal is to show that the conditional 'if the glass were

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argument is largely the goal of this thesis. The other things to which suppositionals might be applied have been ignored.

[85] Fara is referring specifically to the SM conditional.

[86] In this sense, Fara's account and my account are not really at odds. My account does employ a 'funny conditional' of sorts but it is not one that attempts to show that a conditional can be *true* when the antecedent is true and the consequent false.

struck, it would break' can still be *assertable* when the glass is struck and does not break. In Chapter 3 I provided an elaboration of this claim.

My account in terms of suppositional inferences, and Fara's account in terms of 'habituals' are similarly motivated but ultimately different. Fara attempts to dispense with conditionality but retain truth. I attempt to retain conditionality, in the form of suppositions, but dispense with truth. As such, I almost entirely agree with Fara but believe that he does not go quite far enough. In retaining the commitment to the potential truth of dispositional ascriptions, Fara does not quite manage to avoid counterexamples without also avoiding triviality. In this way, my account is both more and less radical than Fara's. It is less radical insofar as it retains something resembling conditionality but it is far more radical insofar as it rejects the claim that disposition ascriptions express propositions that can be true or false.

6.4 Funny conditionals and idealization strategies.

Morreau attempts to respond to the counterexamples to the Simple Conditional Analysis by employing what he calls 'fainthearted conditionals' (1997, p.187). Morreau has us consider an example of a straightforward dispositional claim, and states of a combustible piece of wood that:

> If it is heated thoroughly, then the wood will burn (1997, p.187).

He points out, however, that *modus ponens* fails for this and, as I have demonstrated throughout this thesis, for many other dispositional claims. Morreau provides the example of heating the wood in an environment without oxygen (1997, p.187). This would constitute a confounding counterexample. Under such conditions, the above conditional claim will be false; the manifestation of the wood's dispositions to burn when heated thoroughly will have been confounded; *modus ponens* will have failed. He suggests, however, that we might also make the following claim:

> If it is heated thoroughly, then provided conditions are suitable the wood will burn (1997, p.187).

According to Morreau, the above claim remains true despite the confounding counterexample. Conditionals with these added 'provisos' are what Morreau calls 'fainthearted conditionals (1997. P.187). Conditionals without such provisos are to be called 'boldhearted conditionals' (1997, p.187).

This proviso that generates Morreau's fainthearted conditions is an example of what I call an 'idealization strategy'. In order to avoid counterexamples to the Simple Conditional Analysis, some have proposed a closely related range of such strategies [88]. Such

[88] Choi (2008, p.812) cites 'Mumford's 'ideal conditions' (Mumford 1998, pp. 87–91; 2001, pp. 376–7), Malzkorn's 'normal conditions' (Malzkorn 2000, pp. 457–9), and Bird's 'normal circumstances' (Bird 1998, pp. 233–4; 2000, p. 233)' as examples of these sorts of strategies. Fara's (2005) account in terms of 'habituals' is, I will argue, also of this type. Despite using similar terminology, these idealization strategies are not identical. See, for example, Mumford (2001) on how his strategy differs from Malzkorn's.

strategies usually introduce something like a *ceteris paribus* clause or a 'normal conditions' or 'ideal conditions' clause or something closely related. Morreau's terminology is 'suitable conditions' (1997, p.187). The basic and general idea is that counterexamples can be avoided when an idealization strategy is employed. For example, consider the straightforward case of the fragile glass that does not break when dropped, because it is wrapped in a protective package. This protective packaging confounds the manifestation of the glass's fragility thus rendering false the SM conditional, and hence the CA→ conditional, and hence the Simple Conditional Analysis. In order to exclude such counterexamples, one might wish to claim that the glass will break upon being struck under 'normal' or 'ideal' conditions. These sorts of conditions will exclude situations in which protective packaging, or soft carpet, or some other confounding condition obtains.

There is a slight difference between Fara's idealization strategy and others that have been employed. Idealization strategies are generally employed to *rule out* or possibly *avoid* counterexamples. That is, to state something like Morreau's example, 'if it is heated thoroughly, then provided conditions are suitable, the wood will burn' is to rule out conditions that are unsuitable for burning, and is therefore to rule out counterexamples, as counterexamples will only occur in conditions that are unsuitable. Fara's version of an idealization strategy, however, does not attempt to *rule out* counterexamples but to *tolerate* them (2005, p.66). For example, Fara's habitual statement 'Mary smokes when she gets home from work' is compatible with counterexamples in which Mary does not

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I discuss the details of Fara's below.

smoke when she gets home from work because, for example, she has no cigarettes (2005, p.66).

Anecdotally, whenever I explain confounding and mimicking type problems to people who are not familiar with analyses of dispositions, they often respond with some sort of idealization intuition. Such people will often respond that 'surely what we mean when we ascribe fragility to the well protected glass is that it would have broken *had the protection not been in place*'. These general intuitions are not to be dismissed. Rather, an analysis that retains this intuition while avoiding its problems is desirable.

One of the main problems associated with idealization strategies, however, is that they often render analyses trivial or vacuous. Fara explains this triviality as follows:

> We should not say, for example, that the cup is disposed to break when struck only if it would break if were struck in non-masking conditions. For a "non-masking condition" is just a condition in which the cup would break if it were struck, and so our conditional has been trivialized: the cup is disposed to break when struck only if it would break if it were struck in conditions in which it breaks if struck (2005, p.51) [89].

[89] It is argued by Yli-Vakkuri (2010, p.630), however, of Fara's habitual account that 'when we follow his analysis all the way through, we end with something equivalent to a *ceteris paribus* conditional analysis'. As a result, Fara's account might be accused of this sort of vacuity.

Fara's objection, here, echoes Kitcher's (1989) concerns with counterfactual accounts of causation. Kitcher (1989 p.474) considers an example that involves billiard balls colliding upon rolling across a transparent table, illuminated from above. According to Kitcher, our intuition is that the impact of ball A upon ball B, *caused* or *explains* the motion of ball B. But on a counterfactual account of causation, it might also be said that the crossing of the shadow of ball B by the shadow of ball A, caused the motion of the shadow of ball B; and this seems intuitively incorrect.

Kitcher then presents several potential ways in which an experimental scenario might be devised in order to decide which of these explanations is correct.

Kitcher goes on to argue that in designing an experiment to test which of the above causal explanations is true, the control group ought to be relevantly similar to the experimental group. But, Kitcher (1989, p.475) argues, in deciding on which features are to be considered relevantly similar, we are will select the features that render true the explanation that we consider intuitively correct. In other words, counterfactual accounts of causation presuppose an understanding of causal relevance. As such, we can effectively render true any causal explanation in terms of counterfactuals by considering only the causally relevant similarities. This renders such explanations trivia, or vacuous.

This is quite similar, or at least interestingly analogous to, Fara's argument that idealization strategies render conditional analyses of dispositions trivial or vacuous.

Given that Morreau's approach is, at least in part, an employment of an idealization strategy and that such strategies are subject to this triviality problem, Fara suggests that 'any view according to which disposition ascriptions entail their corresponding conditionals restricted to normal circumstances is likewise trivial' (2005, p.58). While pointing out that Morreau provides a 'fairly detailed and sophisticated possible world semantics' Fara goes on to state that 'the complexity of Morreau's semantics, however, is entirely unnecessary' (2005, p.58). Fara formalizes the truth conditions for Morreau's fainthearted conditional as follows:

'$A \Rightarrow B$' is true at w iff '$(A \wedge P_r) \Box\!\!\rightarrow B$' is true at w

where $\Rightarrow$ is to be understood as Morreau's fainthearted conditional and P_r is to be understood as his proviso function (and an appropriate corner quote convention is in use). Fara points out that Morreau's truth conditions ultimately amount to those of a counterfactual conditional within the scope of an idealization strategy. It has been argued in this thesis and throughout the literature that a straightforward analysis in terms of counterfactual conditionals remains subject to counterexamples. It has also been established that idealization strategies such as these provide a trivial result. Fara concludes that Morreau's account of dispositions in terms of 'funny conditionals' fails.

Morreau explicitly appeals to an idealization strategy in his use of provisos. It should be noted, however, that he *implicitly* appeals to the causal basis of dispositions in, for example, his appeal to the combustibility of wood. He states that the claim 'if it is heated

thoroughly, then provided conditions are suitable, the wood will burn' is true because the wood is combustible (1997, p.187). If the wood did not possess the physical property of being combustible, the claim that 'if it is heated thoroughly, then provided conditions are suitable, the wood will burn' will be false. He also states that wood is not soluble (1997 p.187). Because wood is not soluble, we cannot say of the wood that if it is placed in water then it will dissolve, even under ideal circumstances. There *are* no ideal circumstances for the water solubility of wood because wood does not possess the physical basis of water solubility.

The purpose of idealization strategies is to derestrict the inferences that are licensed by the associated conditional. Recall that Morreau contrasts his fainthearted conditional, which included an idealization condition, with what he calls a 'boldhearted conditional' (1997, p.187). A boldhearted conditional can be understood as being one that is highly restrictive in the inferences that it licenses. That is, the boldhearted conditional 'if it is heated thoroughly, then the wood will burn' has far more potential counterexamples than does the fainthearted conditional 'if it is heated thoroughly, then provided the conditions are suitable the wood will burn'. The boldhearted conditional is more restrictive in the inferences it licenses because it is *less* restrictive in the scope of its generalization. It generalizes over *all* instances of thoroughly heated wood. Any instance of thoroughly heated wood that does not burn constitutes a counterexample to the boldhearted claim. Conversely, the fainthearted conditional is less restrictive in the inferences it licenses because it is *more* restrictive in the scope of its generalization. It generalizes not over all instances of thoroughly heated wood but only over instances of thoroughly heated wood that are also in conditions that are suitable for combustion. As such, only an instance of

thoroughly heated wood that is *also* in conditions that are suitable for combustion, *and yet does not* burn would constitute a counterexample to the fainthearted conditional.

It has been argued exhaustively that the Simple Conditional Analysis, being a relatively boldhearted set of conditionals, is subject to various counterexamples that render it false. It has been argued by those such as Fara that conditional analyses that employ idealization strategies make only trivial claims. The task, then, seems to be to develop an idealization strategy that does not render trivial claims that employ it.

6.5 Idealization and specificity.

As I have demonstrated above, certain idealization strategies are employed in order to defend the Simple Conditional Analysis and its variants from counterexamples. A particular example of what I characterize as type of idealization strategy is what has been called the strategy of 'getting more specific' (Manly and Wasserman 2008, Manly and Wasserman 2011). Upon such a strategy, extra information concerning the circumstances surrounding the stimulus and manifestation of a certain disposition are included in order to render the analysis no longer susceptible to counterexamples.

I argued previously, primarily in Chapter 2, that our background beliefs concerning the instantiation of some dispositional property in some object are important to our reasoning concerning that disposition and the behaviors with which it is associated. In what follows I will explore this claim a little more fully. I will argue that the more background belief

we have, or the more *complete our set of antecedent suppositions*, the more accurate will be the inferences that we make based upon those assumptions. Given that they are more complete they are more restrictive. Because they are more restrictive, they eliminate counterintuitively generous inferences and ascriptions[92].

Crucially, the *circumstances surrounding stimulus and manifestation conditions* contribute to these antecedent suppositions. These circumstances might be such as to be conducive to the manifestation of the disposition, or they might not. This is the point that is made by those who endorse an idealization strategy of some sort.

But if this strategy of getting specific is to be employed, what determines this specificity? That is, what is to be included in the set of antecedent suppositions upon which we base our dispositional inferences? I argue that the thing about which we need to be specific is the context, or situation, in which it is supposed that the disposition is involved.

There are a number of items that might or might not be called fragile under various circumstances or in various contexts. Bird (2009, p.20) suggests that there are certain contexts in which a steel beam might be considered fragile. Consider a steel beam that is

[92] For example, upon a highly unrestricted disposition ascription, it could be said that I possess the disposition to Levitate. Earth's gravity is such that while on Earth, it seems incorrect to ascribe to me the disposition to levitate. If the 'while on Earth' restriction is removed, it might be reasonable to ascribe to me the disposition to levitate as it is possible for me to be located in an environment with insufficient mass/gravitational attraction to prevent my levitation.

perhaps old and corroded or has become brittle through exposure to certain temperature extremes. If this steel beam were to appear in my room, I would not judge it to be among the fragile things in my room. An engineer, however, might consider this beam to be too fragile for use in constructing a bridge. Moreover, this steel beam might be judged fragile even though it is considerably less fragile than other objects that I do not ordinarily consider to be fragile, such my pen. That is, if I were to present my pen to the engineer, I imagine that the engineer would not judge the pen to be fragile. The steel beam, however, while *less* fragile than the pen, is something that the engineer *does* judge to be fragile.

This is due to certain conditions being included in the engineer's antecedent suppositions. If the engineer says of the beam that it is too fragile for use, we reasonably ascribe to the engineer's claim an unuttered antecedent supposition that the beam is to be used under suitably extreme conditions. That is, in saying 'the beam is fragile' we can take the engineer to be saying 'on the supposition that the beam is to be used in a way that will place it under extreme stress, *and* the supposition that the beam's strength under certain stresses possesses a certain value, then I predict that the beam will break or otherwise fail'.

The problem, here, is not an ontological one. The problem is that it does seem reasonable to ascribe fragility to the beam, even though its stimulus and manifestation conditions are considerably different to those of my mug. In other words, we might judge my mug to be fragile because it will shatter if I drop it or strike it with a hammer, but the steel beam will not manifest behaviors associated with fragility in response to these sorts of stimuli. How is it, then, that it seems reasonable to ascribe fragility to the beam? I suggest that it

is reasonable to ascribe fragility to the beam because if we have the belief in the existence of the relevant physical property or properties possessed by the beam, we can reasonably predict or judge that it will break (or somehow fail) on the supposition that it is appropriately acted upon. That is, on the supposition that the beam possesses whatever physical property makes it too fragile for use in the construction of a bridge, and that indeed it is used in the construction of a bridge, we can predict or judge that it will break, or bend, or somehow fail in a manner consistent with whatever physical property has been included in our antecedent supposition.

The actual physical property that an object possesses and the behaviors associated with that property are ontological issues and are not matters of judgment or sensitive to context [93].

A glass, for example, *has* a certain microstructural property in virtue of which it is fragile, or it does not. The *ascription* of a disposition, however, is a matter of judgment and is sensitive to context. To use a crude example, if it were 16 degrees on a winter's morning, I might judge it to be warm but if it were 16 degrees on a midsummer's day, I would judge it to be cold. I make the ascription of coldness based upon context and judgment, even though there is an objective temperature that obtains independently of my judgment

[93] This thesis is concerned with ascriptions but not with the truth or falsity of such ontological claims. There is a difference between reasonably ascribing a property to a thing and making a true/false statement concerning whether or not the thing actually has that property.

and the context in which I make that judgment. Mellor points out that this 'is just an instance of the general question of how to map qualitative predicates onto corresponding quantities: how hot is hot?; how large is large?; and so on. The answers to such questions clearly may depend on our interests and may vary with context' (2000, p.758). As illustrated by the example involving the engineer and the beam, answers to questions concerning whether a thing does or does not possess a disposition will also 'depend on our interests and vary with context'.

There is a relationship between the physical property, or properties, possessed by some object, the behaviors that we associate with those properties, and our judgments concerning the ascription of dispositions to this object. When we say that the steel beam is fragile, we are not making the claim that the behaviors associated with the properties possessed by the beam will be the same as those associated with my mug or pen. What we are claiming is that when we have beliefs concerning the physical properties that the beam possesses, including the sorts of forces that it can and cannot withstand, we are able to predict that it will behave in a manner that we judge to be consistent with fragility when acted upon in a certain way. We would not predict that it will exhibit the behaviors associated with fragility in response to being knocked with a hammer but we might predict it to exhibit the behaviors associated with fragility response to being placed under a great deal of stress, as in the construction of a bridge.

If fragility *just is* breaking when struck, then clearly the beam is not fragile. If fragility is the name we give to some to some physical property that is associated with certain

behaviors, depending upon our interests and the context of utterance, then all manner of things might be called 'fragile'. This being the case, it seems incorrect to even attempt an analysis of some dispositional predicate, such as fragility, *purely* in terms of stimulus and manifestation pairings. What we are really doing is applying a certain descriptive term, such as fragility, to a certain physical property, or properties, in virtue of which certain behaviors might occur under certain conditions. The same strategy can be applied to other examples of unclear dispositional ascriptions. Consider a precious, perhaps very old, book that would reasonably be considered by fragile[94]. It will not break when struck and it does not possess the physical property that makes it the case that things that possess that property will do so. It will, however, do something like tear when roughly handled or something of that sort and does possess the physical property that makes it the case that things that possess that property will do so.

6.6 Counterexamples and specificity.

The strategy of getting more specific can also be applied to counterexamples. Notice that the counterexamples are indeed *specific* occurrences. The analyses are generalizations. A possible approach to the application of specificity is not to make the generalization more specific when the specificity can be applied to the counterexample. For example, consider the common case of confounding the fragility of a glass by packing it in protective packaging. Notice that the addition of the protective packaging is 'getting specific' about

[94] I previously used salt and sugar as an example of things that can reasonably be said to possess different tokens of the type 'fragility'.

the conditions surrounding the stimulus and manifestation of the fragility. What happens when the fragile glass is struck and does not break, due to the protective packaging, *is not* a case of it being struck and not breaking. That is, it is not a straightforward failure of *modus ponens*. What is actually happening is that it is *being struck and protected*, and not breaking. The antecedent 'being struck and protected' is a different antecedent to simply 'being struck'.

An obvious objection to my claim here is that the antecedent 'struck and protected' is really just a conjunction and that it entails the antecedent 'struck'. As such, *modus ponens* will still follow if the conjunction elimination rule is applied. However, I respond as follows: The antecedent suppositions are not propositions. As such, members of the set of antecedent suppositions cannot be individuated in the way that a conjunction of propositions can be. This disallows application of the conjunction elimination rule.

If someone has a very strongly justified belief in the existence of the physical basis of a certain disposition but few additional suppositions concerning the circumstances surrounding the stimulus of that disposition, then relatively many inferences may follow. For example, someone might look at a ball and have a very strongly justified belief that the ball possesses the physical property associated will rolling. If they do not apply the strategy of getting specific by including a good deal of additional antecedent suppositions concerning the circumstances surrounding the stimulus of that disposition, then all sorts of inferences concerning the ball may follow. It might roll if pushed in a certain direction; it might not roll if pushed in that direction because that direction is up a very steep incline and the ball is quite massive; and so on. That is, upon the ICA→ conditional, all manner

of predictions will be licensed given the relative dearth of information included in the set of antecedent suppositions.

If we have a very strongly justified belief that some object is a sphere, and a good understanding of what behaviors spherical objects produce under certain conditions, *and* we do apply the strategy of getting specific by supposing a very great deal of information concerning the conditions surrounding the stimulus of that disposition, then relatively few, perhaps very few, perhaps only one, prediction will follow our set of antecedent suppositions. Given that so few predictions may follow given that set of antecedent suppositions, that prediction will likely be accurate; perhaps so accurate as to give the appearance of necessity.

In order to illustrate, allow for the purpose of discussion that we have a closed system that consists of a sphere, a flat, smooth plane and nothing else. This system possesses the same physical laws as our universe and we have a complete knowledge of all variables such as the amount of friction that exists between the sphere and the surface and so on. Given this information, we can very reasonably be near certain that the ball will roll if pushed. It is only when we add extra variables to the system, variables about which we have no knowledge and hence are not included in our antecedent suppositions, that counterexamples become possible. For example, suppose we did not know that there was a tremendous amount of friction between the sphere and the surface, or that there was an opposing force that will be placed on the ball when it is pushed, or something of that sort. It is in these cases that counterexamples become possible. Of course the world in which we live, and frequently make dispositional ascriptions and inferences about, is *highly*

variable in this way. This is why counterexamples, both actual and imagined, are pervasive. Counterexamples are simply a result of lack of sufficient specificity in our antecedent suppositions.

Counterexamples, or couched in terms of ICA→ suppositional, inaccurate predictions, may be generated in situations in which our antecedent suppositions are either insufficiently specific or not strongly justified, or both. The observation of a 'sphere' may actually have been the observation of a 2 dimensional disc viewed from a particular angle that made it appear to be a sphere. This disc when pushed on a plane towards the third dimension (the z axis) will simply fall flat on the ground, rather than roll. This supposition that the disc is a sphere is an example of an antecedent supposition that is sufficiently specific but simply inaccurate. In this case, a predication that the 'sphere' will roll when pushed will be inaccurate. It does not, however, stand as a counterexample to the *supposition* that a *sphere* will roll when pushed. It is merely an inaccurate *prediction* because the antecedent supposition that the object in question is a sphere is not accurate[96].

6.7 Summary.

While my supposition account of dispositions cannot avail itself of the consideration of normal conditions that are a feature of the possible world semantics associated with

[96] In this way, my suppositional account, like Fara's habitual account, tolerates counterexamples. Inaccurate predication, retrodictions, and explanations may be encountered such cases do not constitute counterexamples to the *supposition*.

counterfactual conditionals, the suppositional account is able to incorporate normal conditions into its antecedent suppositions by application of what Manley and Wasserman call the 'strategy of getting specific'.

I have argued that the content of this specificity is a matter of context sensitivity. That is, included in the set of antecedent suppositions are details concerning the specific context in which the disposition is involved.

The set of antecedent suppositions, then, will include such things as suppositions concerning the existence or otherwise of properties possessed by the object in question, combined with suppositions concerning the behaviors associated with those properties, *and importantly* suppositions concerning the circumstances, or conditions, or context in which we suppose that the object will be acted upon.

In ascribing fragility to the mug and to the steel beam we are not asserting that they have the same physical properties. What we are saying is that within the scope of the supposition that some object possesses certain physical properties, combined with our beliefs concerning the behaviors with which those properties are associated, *and* the conditions under which those properties generate those behaviors *and* that those conditions obtain, then it can be reasonable to predict that the object will manifest the behaviors that we associate with that physical property under those conditions. In the case of the mug and the steel beam, these antecedent suppositions will be different.

The more information that we include in our idealization conditions, or antecedent suppositions, the more restricted the suppositional claim. That is, the more we include in our idealization suppositions, such as 'the wood is dry' and 'the wood is in an oxygen rich environment', the fewer counterexamples are possible. According to Mumford, 'when one begins to fill in the detail of the ideal conditions, one is then speaking of a more precise disposition concept' (2001 p.377). The claim 'the wood will burn if it is combustible and it is dry' is less restricted than is the claim that 'the wood will burn if it is combustible and it is dry and it is in an oxygen rich environment and heated to greater than *x* Celsius and is impregnated with a chemical accelerant'.

As such, by specifying in our antecedent suppositions, the conditions in which the disposition is involved, the suppositional account of dispositions is able to retain the 'normal conditions' feature of counterfactual conditionals, while also avoiding counterexamples, and triviality results.

To summarize, the suppositional account contains the resources to explain our ordinary practices of appealing to ordinary conditions involving disposition ascriptions, and that it does so without the apparatus, and associated costs, of counterfactuals. As such, it stands as a suitable alternative to Fara's, also attractive, though arguably too metaphysically committal, account in terms of habituals.

7 Summary.

I have argued that the kind of intuitions we have concerning the conditionality of dispositions can be captured by an account in terms of suppositionals. Upon my account, stimulus and manifestation conditions are observable behaviors that, if observed, provide evidence for the existence of an unobservable dispositional property. On the supposition that a dispositional property obtains and that it is appropriately stimulated, a prediction of an observable manifestation is licensed. Observation of a manifestation, combined with the supposition that its associated dispositional property obtains, licenses an inference to the explanation that the manifestation was caused by dispositional property having been stimulated. None of these inferences are truth-functional, nor do they have truth conditions, nor do they express propositions. As such, they cannot be said to be true or false. This being the case, they are not subject to the standard counterexamples to conditional analyses of dispositions.

So, to make a disposition ascription, roughly, is to take on the following commitments:

On the supposition that an object possesses a certain dispositional property, *and* the property is appropriately stimulated, *and* the circumstances surrounding its stimulation are, according to context, conducive to its manifesting its associated behaviors (i.e. no confounders)] then it can be predicted that x will manifest its associated behaviors.

And:

On the supposition that an object possesses a certain dispositional property, *and* that the property manifested its associated behaviors, *and* that the circumstances surrounding its manifestation were, according to context, conducive to its manifesting its associated behaviors (i.e. no mimics), then it can be inferred that it was stimulated.

And:

On the supposition that an object is appropriately stimulated, *and* that an associated manifestation follows, *and* that the circumstances surrounding its manifestation are, according to context, conducive to its manifesting its associated behaviors (i.e. no mimics and no confounders), then evidence for the existence of the associated dispositional property is provided. Or, expressed otherwise the manifestation following the stimulus under those circumstances can be reasonably *explained by* the existence of the associated dispositional property.

So, where N represents whatever normal conditions are invoked in the application of an idealization strategy, each of my three suppositions inferences, which jointly constitute my suppositional account of dispositions, can be formally expressed as:

ICA→: supposing (D & S & N): M

ICA←: supposing (S & M &N): D

ICA3: supposing (D & M &N): S

Given that none of these express propositions, and hence cannot be true or false, none can be rendered false by counterexamples. At worst, the account might face an example in which the inference from the antecedent suppositions to the consequent is shown to be inaccurate or unreliable. However, given that the suppositional account is largely epistemic, any proposed counterexample would not be a *counter*example to the account but would instead be simply an *example* of our limited epistemic capacities. Our explanations are sometimes not good, and our predications are sometimes not accurate. Its ability to capture this fact about our epistemic limitations concerning dispositions is, I think, an attractive feature of the suppositional account.

Fara states that a 'promising approach would be to forget about conditionals, and try to state the truth conditions of disposition ascriptions in some other way' (2005, p.61). In having proposed an analysis of dispositions in terms of suppositionals, I have effectively proposed the converse of Fara's 'promising approach'. To summarize the suppositional account of dispositions, what I have done is, to reuse Fara's expression, forget about truth conditions and try to account for the apparent conditionality of disposition ascriptions in some other way. This 'other way' stands as a plausible, and to those who share my desire for a metaphysically minimal, empirically robust account, attractive alternative to extant conditional analyses of dispositions.

References:

Adams, E., 1965, 'The Logic of Conditionals', *Inquiry*, Vol. 8, pp. 166-197.

Adams, E., 1975, *The Logic of Conditionals*, Dortrecht, Reidel.

Armstrong, D.M., 1968, *A Materialist Theory of Mind*, London, Routledge.

Armstrong, D.M., 1983, *What is a Law of Nature?*, Cambridge, Cambridge.

Armstrong, D.M., 2012, 'Defending Categoricalism' in *Properties, Powers and Structures*. Bird. A., Ellis, B., and Sankey H. (Eds.) New York. Routledge. pp. 27-33.

Armstrong, D.M., Martin, C.B. and Place U.T., 1996, *Dispositions: A Debate*, London, Routledge.

Bauer, W.A. 2012, 'Four Theories of Pure Dispositions' in *Properties, Powers and Structures*. Bird. A., Ellis, B. and Sankey H., (Eds.) New York. Routledge. pp. 139-162.

Berendzen, R., 1972, *Life Beyond Earth and The Mind of Man,* NASA Scientific and Technical Information Office, Washington D.C.

Bird, A., 1998, 'Dispositions and Antidotes', *The Philosophical Quarterly*, Vol. 48, No. 191, pp. 227-234.

Bird, A., 2001, 'Necessarily, Salt Dissolves in Water', *Analysis*, Vol. 61, No.4, pp. 267-274.

Bird, A., 2004, 'Antidotes All the Way Down?', *Theoria*, Vol. 19, No. 3, pp. 259-269.

Bird, A., 2005a, 'The Dispositionalist Conception of Laws', *Foundations of Science*, Vol. 10, No. 4, pp. 353-370.

Bird, A., 2005b, 'Laws and Essences', *Ratio,* Vol. 18, pp. 437-461.

Bird, A., 2006, 'Potency and Modality', *Synthese*. Vol. 149, pp. 491-508.

Bird, A., 2007, 'The Regress of Pure Powers?', The Philosophical Quarterly, Vol. 229, pp. 513-534.

Bird, A., 2009, *Nature's Metaphysics: Laws and Properties*, New York, Oxford.

Bird, A., 2012, 'Monistic Dispositional Essentialism' in *Properties, Powers and Structures*. Bird. A., Ellis, B. and Sankey H., (Eds.) New York. Routledge, pp. 35-41.

Blackburn, S., 1990, 'Filling in Space', *Analysis*. Vol. 50, No. 2, pp. 62-65.

Bostock, S., 2003, 'Are All Possible Laws Actual Laws?', *Australasian Journal of Philosophy*, Vol. 81, No. 4, pp. 517-533.

Braddon-Mitchell, D. and Nola, R., 2009, 'Introducing the Canberra Plan' in *Conceptual Analysis and Philosophical Naturalism*, Braddon-Mitchell, D. and Nola, R., (eds.), Cambridge, MIT, pp. 1-20.

Carnap, R., 1936, 'Testability and Meaning', *Philosophy of Science*, Vol. 3, No. 4, pp. 419-471.

Carnap, R., 1956, 'The Methodological Character of Theoretical Concepts', *Minnesota Studies in The Philosophy of Science*. Vol. 1, pp. 38-76.

Choi, S., 2006, 'The Simple vs Reformed Conditional Analysis of Dispositions', *Synthese,* Vol. 148, No.2, pp. 369-379.

Choi, S., 2008. 'Dispositional Properties and Counterfactual Conditionals', *Mind*, Vol. 117, pp. 795-841.

Choi, S., 2009, 'The Conditional Analysis of Dispositions and the Intrinsic Dispositions

Thesis', *Philosophy and Phenomenological Research*, Vol. LXXVIII, No. 3, pp. 568-590.

Choi, S., 2011, 'Finkish Dispositions and Contextualism', *The Monist*, Vol. 94, No.1, pp. 103-120.

Choi, S., 2012, 'What is a Dispositional Masker?', *Mind*, Vol. 120, pp. 1-13.

Choi, S. and Fara, M., 2014, 'Dispositions' in *The Stanford Encyclopedia of Philosophy*, (Spring 2014 Edition), Zalta, E.N., (ed.), URL = <http://plato.stanford.edu/archives/spr2014/entries/dispositions/>.

Churchland, P., 2005, 'Functionalism at Forty: A Critical Retrospective', *The Journal of Philosophy*, Vol. 102, No. 1, pp. 33-50.

Corry, R., 2012, 'Emerging From The Causal Drain', *Philosophical Studies*, Vol. 165, No. 1, pp. 29-47.

Edgington, D., 1986, 'Do Conditionals Have Truth Conditions?', *Crítica: Revista Hispanoamericana de Filosofía,* Vol. 18, No. 52, pp. 3-39.

Ellis, B. and Lierse, C., 1994, 'Dispositional Essentialism', *Australasian Journal of Philosophy*, Vol. 72, No. 1, pp. 27-45.

Ellis, B., 2012, 'The Categorical Dimensions of The Causal Powers' in *Properties, Powers and Structures*. Bird. A., Ellis, B., and Sankey H., (Eds.), New York, Routledge, pp. 11-26.

Fara, M., 2005, 'Dispositions and Habituals', *Nous*, Vol. 39, No. 1, pp. 43-82.

Goodman, N., 1983, *Fact, Fiction and Forecast*, (Fourth Edition), Cambridge, Harvard.

Graham, G., 2014, 'Behaviorism' in *The Stanford Encyclopedia of Philosophy*, (Spring 2014 Edition), Zalta, E.N., (ed.), URL = <http://plato.stanford.edu/archives/spr2014/entries/behaviorism/>.

Handfield, T., 2004, 'Counterlegals and Necessary Laws', *The Philosophical Quarterly*, Vol. 54, No. 216, pp. 402-419.

Harman, G., 1965. 'The Inference to the Best Explanation', *Philosophical Review*. Vol. 74, No. 1, pp. 88-95.

Jackson, F., 1994, 'Armchair Metaphysics' in *Philosophy in Mind*, O'Leary-Hawthorne, J. and Michael, M., (eds.), Dortrecht, Kluwer, pp. 23-42.

Jackson, F., 1998, *From Metaphysics to Ethics*, Oxford, Clarendon.

Jackson, F. and Pettit, P., 1990a, 'In Defence of Folk Psychology', *Philosophical*

Studies. Vol. 59, pp. 31-54.

Jackson, F. and Pettit, P., 1990b, 'Program Explanation: A General Perspective', *Analysis*, Vol. 50, No. 2, pp. 107-117.

Johnston, M., 1992, 'How to Speak of the Colors', *Philosophical Studies*. Vol. 68. pp. 221-263.

Kim, J., 1989, 'Mechanism, Purpose and Explanatory Exclusion', *Philosophical Perspectives*, Vol. 3, pp. 77-108.

Kim, J., 1998, *Mind in A Physical World*, Cambridge, MIT.

Kitcher, P., 1989, 'Explanatory Unification and the Causal Structure of the World' in *Minnesota Studies in the Philosophy of Science*, Kitcher, P. and Salmon, W., (eds.), Minneapolis, Minnesota Press, pp. 410-505.

Kripke, S., 1982, *Wittgenstein on Rules and Private Language*, Oxford, Blackwell.

Lange, M., 2002, *An Introduction to The Philosophy of Physics*, Oxford, Blackwell.

Lewis, D., 1970, 'How to Define Theoretical Terms', *The Journal of Philosophy*, Vol. 67, No. 13, pp. 247-446.

Lewis, D., 1972, 'Psychophysical and Theoretical Identifications', *Australasian Journal of Philosophy*, Vol. 50, No. 3, pp. 249-258.

Lewis, D., 1973, *Counterfactuals*, Oxford, Blackwell.

Lewis, D., 1979, 'Counterfactual Dependence and Time's Arrow' *Nous*, Vol. 13, pp. 455-476.

Lewis, D., 1983, 'Mad Pain and Martian Pain' in *Philosophical Papers, Vol. 1*, New York, Oxford.

Lewis, D., 1997, 'Finkish Dispositions', *The Philosophical Quarterly*, Vol. 47, No. 187, pp. 143-158.

Lewis, D., 1999, 'Reduction of Mind' in *Papers in Metaphysics and Epistemology*, Lewis, D., (ed.), Cambridge, Cambridge, pp. 291-234.

Lewis, D., 2000, 'Causation as Influence' *Journal of Philosophy*, Vol. 97, pp. 182-197.

Lycan, W., 1996, *Consciousness and Experience*, Cambridge, MIT Press.

Lowe, E.J., 2011, 'How *Not* to Think of Powers: A Deconstruction of the "Dispositions and Conditionals" Debate', *The Monist*, Vol. 94, No. 1, pp. 19-33.

Malzkorn, W., 2000, 'Realism, Functionalism, and The Conditional Analysis of Dispositions', *The Philosophical Quarterly*, Vol. 50, No. 201, pp. 452-469.

Manly, D. and Wasserman, R., 2008, 'On Linking Dispositions and Conditionals', *Mind*, Vol. 117, pp. 59-84.

Manly, D. and Wasserman, R., 2011, 'Dispositions, Conditionals, and Counterexamples', *Mind*, Vol. 120, pp. 1191-1227.

Martin, C.B., 1994, 'Dispositions and Conditionals', *The Philosophical Quarterly*, Vol. 44, No. 174, pp. 1-8.

Martin, C.B., 1997, 'On the Need for Properties: The Road to Pythagoreanism and Back', *Synthese,* Vol. 112, No. 2, pp. 193-231.

McGee, V., 1985, 'A Counterexample to Modus Ponens', *The Journal of Philosophy*, Vol. 82, No. 9, pp. 462-471.

McKitrick, J., 2003, 'The Bare Metaphysical Possibility of Bare Dispositions', *Philosophy and Phenomenological Research*. Vol. LXVI, No. 2, pp. 349-369.

Mellor, D. H., 1974, 'In Defense of Dispositions', *The Philosophical Review*, Vol. 83, No.2, pp. 157-181.

Mellor, D. H., 1982, 'Counting Corners Correctly', *Analysis*, Vol. 42, No. 2, pp. 96-97.

Mellor, D.H., 2000, 'The Semantics and Ontology of Dispositions', *Mind*, Vol. 19, No. 436, pp. 757-780.

Molnar, G., 2009, *Powers: A Study in Metaphysics*, Oxford, Oxford.

Morreau, M., 1997, 'Fainthearted Conditionals', *The Journal of Philosophy*, Vol. 94, No. 4, pp. 187-211.

Mumford, S., 1996, 'Conditionals, Functional Essences and Martin on Dispositions', *The Philosophical Quarterly*, Vol. 46, No. 182, pp. 86-92.

Mumford, S., 1998, *Dispositions*, Oxford, Oxford.

Mumford, S., 2001, 'Realism and the Conditional Analysis of Dispositions: Reply to Malzkorn', *The Philosophical Quarterly*, Vol. 51, pp. 375-378.

Mumford, S., 2004, *Laws in Nature*, Oxford, Routledge.

Mumford, S., 2006, 'The Ungrounded Argument', *Synthese*, Vol. 149, pp. 471-489.

Mumford, S. and Anjum, R.L., 2011, *Getting Causes from Powers*, Oxford, Oxford.

Mumford, S. and Anjum, R.L., 2012, 'Causal Dispositionalism' in *Properties, Powers and Structures*. Bird. A., Ellis, B. and Sankey H., (Eds.) New York, Routledge, pp. 101-118.

Nagel, T., 1974, 'What is it like to be a Bat?', *Philosophical Review*, Vol. 83, No. 4, pp. 435-456.

Nozick, R., 1981, *Philosophical Explanations*, Cambridge, Cambridge.

O'Leary-Hawthorne, J. and Price, H., 1996, 'How to Stand up for Non-Cognitivists' *Australasian Journal of Philosophy*, Vol. 74, No. 2, pp. 275-292.

Place, U.T., 2000, 'The Causal Potency of Qualia: Its Nature and Its Source', *Brain and Mind*, Vol. 1, No. 2, pp. 183-192.

Prior, E., 1982, 'The Dispositional/Categorical Distinction', *Analysis*, Vol. 42, No. 2, pp. 93-96.

Prior, E., Pargetter, R. and Jackson, F., 1982, 'Three Theses About Dispositions', *American Philosophical Quarterly*, Vol. 19, No. 3, pp. 251-257.

Ryle, G., 1980, *The Concept of Mind*, Harmondsworth, Penguin.

Shope, R.K., 1978, 'The Conditional Fallacy in Contemporary Philosophy', *The Journal of Philosophy*. Vol. *LXXV*, No.8, pp. 397-413.

Skinner, B.F., 1977, 'Why I Am Not a Cognitive Psychologist', *Behaviorism*, Vol. 5, No. 2, pp. 1-10.

Smart, J.J.C., 1959, 'Sensations and Brain Processes', *The Philosophical Review*, Vol. 68, No. 2, pp. 141-156.

Stalnaker, R., 1968, 'A Theory of Conditionals' in *Studies in Logical Theory*, Rescher, N., (ed), Oxford, Blackwell, pp. 98-112.

Van Fraassen, B., 1980, *The Scientific Image*, Oxford, Oxford.

Van Fraassen, B., 1989, *Laws and Symmetry*, Oxford, Oxford

Wittgenstein, L., 1953, *Philosophical Investigations*, Anscombe, G.E.M., and Rhees, R. (eds.), Oxford, Blackwell.

Watson, J., 1913, 'Psychology as the Behaviorist Views It', *The Psychological Review*, Vol. 20, No. 2, pp. 158-177.

Yli-Vakkuri, J., 2010, 'Conditional and Habitual Analyses of Disposition Ascriptions', *The Philosophical Quarterly*, Vol. 60, No. 240, pp. 624-630.