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A Reason to Avoid the Causal Construal of Dispositional Explanations

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ABSTRACT: Those who argue that dispositional explanations are genuine explanations usually construe them as causal explanations. There are several well-known arguments against the causal efficacy of dispositions, but there are as well demonstrations that on some minimal conditions, dispositions could be viewed as causally relevant to the effects which they are taken to explain. Although the latter position is generally tenable, it may be shown that in some important cases it is not a good idea to commit to a causal construal of dispositional explanations. The argument goes as follows: (1) Dispositional explanations are valued for certain specific extra-inferences which they allow us to draw; (2) The causal construal of dispositional explanations can account for some of these extra-inferences only on the assumption that the disposition is a common cause of its manifestations; (3) However, under certain circumstances, the common cause assumption is refuted on theoretical or empirical grounds; Therefore, (4) under certain circumstances, the causal construal of dispositional explanations cannot account for what these explanations are valued for. The latter conclusion is a reason to argue that in some cases at least, the causal construal of dispositional explanations should be avoided.

KEYWORDS: Dispositions – dispositional explanations – extra-inferences – non-causal construal of dispositions – surplus meaning – trait explanations in psychology.

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1. Introduction

Those who argue that dispositional explanations are genuine explanations usually construe them as causal explanations either by assigning a direct causal role to the explanatory dispositions (or to their 'causal bases')[2] or by representing dispositions as parts of, or referring to, larger complexes which play the causal/explanatory role (cf. Hempel 1965; Vanderbeeken & Weber 2002). There are several well-known arguments against the causal construal of dispositions which allegedly demonstrate that dispositions could not play a causal role.[3] There are at the same time demonstrations that on some minimal conditions, dispositions could be viewed as causally relevant to the effects which they are taken to explain (cf. McKitrik 2005). Although the latter position is generally tenable, it can be shown that, in some cases at least, it is not a good idea to commit to the causal construal of dispositional explanations. The main argument goes as follows: (1) Dispositional explanations are valued for certain specific extra-inferences which they allow us to draw and which raise our understanding of explained phenomena; (2) The causal construal of dispositional explanations can account for some of the extra-inferences which the dispositional explanations allow for only on the assumption that the disposition is a common cause of its manifestations; (3) However, under certain circumstances, the common cause assumption is refuted on either theoretical or empirical grounds, or both; Therefore, (4) under certain circumstances, the causal construal of dispositional explanations cannot account for the extra-inferences which these explanations are valued for. The latter conclusion is a reason to argue that the causal construal of dispositional explanations

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[2] The view that dispositions play a direct causal role has been defended by Nancy Cartwright. She, however, prefers the term 'capacities' instead of 'dispositions' (see Cartwright 1999). Armstrong is a famous defender of the view that dispositions could be assigned a causal role if, and only if, we identify them with their underlying causal bases (see Armstrong, Martin & Place 1996).

[3] The most popular are the so-called "Analyticity Argument" (cf. Armstrong 1968; Mackie 1973; Block 1990; Dardis 1993; Jackson 1995) and the "Exclusion Argument" (cf. Kim 1990; Block 1990); see McKitrk (2005) and Choi & Fara (2012) for a concise presentation of both arguments. Hüttemann (2009) has raised an additional objection against the causal view of dispositions: the latter could not be construed as causes of their manifestations because they do not precede their manifestations in time.

should be avoided if we value the inferential benefits provided by these explanations.

After introducing some preliminaries in section 2, the premises (1) – (3) of the argument against the causal construal of dispositional explanations are discussed in more detail in sections 3 and 4. Section 5 presents the view that dispositional explanations are better viewed as forming a distinct type of explanation and that the explanatory virtues of these explanations build on the extra-inferences which they allow for. The last section 6 summarizes the rationale for the proposal to give up the causal construal of dispositional explanations and analyze them instead in terms of their inferential virtues.

2. Some preliminaries

2.1. Two ways to present a dispositional explanation

A dispositional explanation could be presented in the following way:

(2.1) 'X did B in the situation S because X has the *dispositional property* D'.

Here are some examples of dispositional explanations:

E1: 'The vase broke when it fell on the floor because the vase is fragile.'

E2: 'John hit Mary when she provoked him because John is aggressive.'

X in the sentence (2.1) stands for the object (the agent) which possesses the dispositional property D. B is usually called a *manifestation* of the dispositional property D and the situation S contains, or coincides with, the *stimulus condition,* which activates the manifestation B (cf. Choi & Fara 2012).

In (2.1) the stimulus condition (the situation S) is presented as a part of the *explanandum,* i.e. it precedes the because-clause. It is possible, however, to reformulate (2.1) in the following way:

(2.2) 'X did B because X has the dispositional property D and X was in the situation S.'

In (2.2) the stimulus condition (the situation S) is presented as a part of the *explanans,* i.e. as a part of the because-clause. If we reformulate the examples E1 and E2 in accordance to (2.2), we'll receive the following explanations:

E12: 'The vase broke because it is fragile and it fell on the floor.'

E22: 'John hit Mary because John is aggressive and Mary provoked him.'

Intuitively, the two forms of the presented dispositional explanations (the forms E1 and E2 on the one hand and E12 and E22 on the other hand) have different meanings but without undertaking an additional analysis, we don't seem to have any good reason to prefer the one form instead of the other. The distinction between the forms (2.1) and (2.2) should be taken seriously in any analysis of dispositional explanations, especially by those who construe dispositional explanations as causal explanations. This is because the choice between (2.1) and (2.2) determines what kind of a causal role one is allowed to assign to dispositions. For example, if we construe a dispositional explanation following (2.1) form we must assign a direct causal role to the dispositional property D, but if we choose (2.2) form we may assume that dispositions are not independent causal factors as they play a causal role only in conjunction with the stimulus conditions which have evoked their manifestations.

2.2. Dispositional vs. categorical properties

In both forms of dispositional explanations the role of the stimulus condition S is crucial, although this role, as it was shown above, is different in (2.1) and (2.2). Some are tempted to assume that stimulus conditions are indispensable parts of dispositional explanations because it is a distinctive characteristics of all *dispositional properties* (e.g. the properties of being fragile, soluble, aggressive, vulnerable etc.) that they are always manifested under some stimulus conditions while *categorical properties* (e.g. the properties of being made of wood or glass, being round, having a particular mass etc.) are present under all conditions (cf. Choi & Fara 2012).

Philosophers, however, have never shared a common view about the dispositional/categorical divide. According to the so-called *categoricalists,* a famous representative of which is D. Armstrong (see Armstrong 1997), all real properties are categorical properties. On this view, the terms which seemingly refer to dispositional properties are mere shortcuts for categorical properties. In contrast to *categoricalism*, the view called *dispositionalism* states that (at least some of) the real properties in the world are essentially dispositional, i.e. irreducible to any categorical properties.[4] As we shall see in the next section 2.3, categoricalism and dispositionalism entail different views on the explanatory status of dispositions. The categoricalists usually claim that dispositions, being at best shortcuts for categorical properties, are causally inert and thus non-explanatory. Most of the dispositionalists recognize the causal efficacy of dispositions and their irreducible explanatory role. If, however, we embrace a view where the explanatoriness of dispositions is disentangled from their causal status, we are not anymore forced to take a side in the debate about the proper ontology of dispositions.

2.3. Different views on the explanatory status of dispositional explanations

One can recognize in philosophical literature three major views on the explanatory status of dispositions (cf. Mumford 1998):

(a) Dispositions do not play any explanatory role.

This is the position defended by most of the categoricalists (see above) who insist that dispositions, if they exist at all, are causally inert and, therefore, non-explanatory.

(b) Dispositions play only a heuristic role pointing to where to look for genuine causal explanations.

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[4] The extreme version of dispositionalism stating that *all* properties are essentially dispositional can be found in Popper (1959) or Mumford (2004). Another kind of extreme dispositionalism is the view that all properties are at once dispositional and qualitative, i.e. categorical (see Heil 2005).

Part of the categoricalists tolerate a temporary use of dispositional explanations in situations where there is a lack of information about the alleged categorical bases of the dispositional properties.

(c) Dispositional explanations are genuine causal explanations.

Those who subscribe to (c), however, differ significantly in their views on how dispositional explanations should be construed as causal explanations. Very few of them, for instance, claim that dispositions possess causal powers.[5] Dispositions are usually taken to have a causal role either in a couple with their causal bases (cf. Armstrong, Martin & Place 1996), or in conjunction with the situations in which they are manifested (see Hempel 1965). On the other hand, those who criticize the causal role of dispositions provide arguments against the possibility for dispositions to play a direct causal role (cf. Armstrong 1968; Mackie 1973; Block 1990; Kim 1990; Dardis 1993; or Jackson 1995).

Besides the three major views (a) – (c), a recent view (d) states that:

(d) Dispositional explanations are genuine non-causal explanations.

According to this view, dispositions do not cause, neither on themselves nor along with other factors, the explained phenomena (cf. Hütteman 2009). Hütteman builds his argument for a non-causal construal of dispositional explanations on the claim that dispositions cannot be construed as causes as they do not precede their manifestations in time. However, as McKitrik (2005) has shown, it is possible to construe dispositional explanations as causal explanations if we embrace a sufficiently weak, "disposition-friendly" criterion for causal relevance which does not include the clause that causes must be independent from their effects and temporally precede them.

In this paper I'll argue against the causal construal of dispositional explanations on a different basis. It will be demonstrated that even in cases where the causal construal of dispositional explanations is possible, this construal leads to assumptions which are unacceptable for theoretical and empirical reasons.

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[5] Nancy Cartwright is a famous defender of this view – see Cartwright (1999); see also Heil (2005).

3. What dispositional explanations are good for?

According to an influential view (see Quine 1969; Armstrong 1973), dispositional explanations are at best (temporary) substitutes for genuine causal explanations. I am not going to discuss here the arguments for this view.[6] It suffices to note, that if there are dispositional explanations which are irreducible to non-dispositional ones in disciplines as diverse as physics and psychology,[7] these explanations probably play a role which exceeds that of a substitute and which deserves a more careful analysis.

Let us consider again the simple example E1: 'The vase broke when it fell on the floor because the vase is fragile.' A categoricalist would argue that the explanation E1 could be reduced to the following one:

E1*: 'The vase broke when it fell on the floor because the vase is made of glass and the crystalline structure of glass makes it fragile.'

At first glance, E1* does not only serve as a good substitute for E1 but it even looks a "deeper" explanation as far as in addition to explaining why this particular vase broke, it explains as well why the vase is fragile (the vase is fragile because of its crystalline structure). From this perspective, E1* does look superior to E1.

But let's take a different perspective. Let's ask about what one can infer from each of these explanations. Given E1*, we are entitled to expect that not only this particular vase will break if it falls on the floor but any object of a similar mass, which is made of glass having the same crystalline structure will break too, if it falls on the floor from the same or a bigger height.

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[6] A simplified form of the standard argument goes as follows: all genuine explanations are causal explanations; dispositions are causally inert (although they can refer to, or be grounded in, causally efficient categorical properties); therefore, dispositions in themselves could not play an explanatory role.

[7] Quantum mechanics, as it is understood today, seems to leave no room for non-dispositional interpretations of the properties of the fundamental particles. See, e.g., Bigaj (2012) for a nice explanation of why such properties as the spin of an electron are best understood as irreducible dispositional properties. In a similar vein, many personality psychologists and philosophers of psychology view personality traits as dispositions which are not reducible to neurophysiological, genetic or other biological or physical categories (see Wiggins 1973; Cervone 2004; Borsboom 2015; Gurova 2017).

Given E1, however, we are entitled to expect much more. For instance, we are justified to suppose that a fragile ceramic vase (or another fragile ceramic object) will break if we drop it on the floor. The same should be expected about a fragile match house, or a fragile egg, if they are dropped on the floor, although they do not have a crystalline structure like the glass vase from E1. In other words, the dispositional explanation E1 has a bigger *inferential content* (i.e. it allows for a larger number of inferences to be drawn) than its non-dispositional substitute E1*. One can ask here, why should we care about the explanations' inferential content? What follows may count as an answer of this question: If we agree with the widely supported claim that the primary goal of any explanation is to enhance our understanding of the explained phenomenon (cf. Friedman 1974; Lipton 2004), and if we agree that a distinctive mark of understanding is the ability to go "beyond the information given" (see Bruner 1957), then we may also agree that the inferential content of a given explanation (the extra-inferences which this explanation allows for) is a good measure of the explanation's capacity to lead us "beyond the information given".

In fact, in many areas where dispositional explanations are used, they are appreciated exactly for their capacity to suggest inferences which go "beyond the information given". In psychology, for instance, many insist that dispositional explanations carry "surplus meaning" where "surplus meaning" is just another term referring to the extra-inferences which a given explanation allows for. The following citation from two eminent personality psychologists is representative for the latter view:

> [an] explanation becomes useful only when it provides surplus meaning and allows inferences which go beyond the observed data. … Traits are defined as enduring dispositions, and are hypothesized to be related to outcome variables; thus trait explanation carries with it the implication that long-term predictions can be made. (McCrae & Costa 1995, 243)

Indeed, given E2, i.e. given the knowledge that 'John hit Mary when she provoked him because John is aggressive', we may reliably predict that John has probably attributed a hostile intention to Mary's provocation, as well as we may expect that John will not hesitate to harm somebody if John sees the harm as a means to achieving his goals.

To summarize, dispositional explanations are valued for two types of inference which they allow for. Given the dispositional explanation (2.1), for example, we may derive that:

(3.1) X is expected to do B_1 in S_1, or B_2 in S_2, or … B_n in S_n, if B_1 – B_n are known possible manifestations of the dispositional property D, which X possesses.

Let's call the inferences like (3.1) 'inferences to different manifestations'. Given (2.1.), we are also entitled to assume that:

(3.2) Any object (agent) Y, which is different from X, will do B* in S* if he possesses the dispositional property D.

In (3.2) B* and S* stand for any manifestation and stimulus condition which are identical or similar to B and S. Let's call the (3.2) like inferences 'inferences to different objects (agents)'.

Let's see now what happens with these two types of inference when we construe dispositional explanations as causal explanations.

4. What happens when dispositional explanations are construed as causal explanations?

In the previous section, we saw that, at least in some areas, the higher inferential content of dispositional explanations has been recognized as their main explanatory virtue. Now we have to see what happens when we try to account for this virtue by assigning a causal role to the explanatory dispositions.

4.1. The inferences to different manifestations

Let's consider again the example E2: 'John hit Mary when she provoked him because John is aggressive'; and let's assign the following values to the variables B, S and D:

B = 'John hit Mary.'
S = 'Mary provoked John.'
D = 'John is aggressive.'

Then if we use one of the "disposition-friendly" criteria for causal relevance (cf. McKitrick 2005), e.g. the probabilistic criterion,[8] the following inequality must be satisfied in order to claim that the disposition D is causally related to the *explanandum* (B, S):

(4.1) $P(B, S|D) > P(B, S|\text{non-}D)$[9]

Let's assume now that (4.1) is satisfied, i.e. the disposition D (John's aggressiveness) is causally related to the *explanandum* (B, S) ('John hit Mary when she provoked him.'). As it was shown in section 3, explanations like E2 are valued because they allow us to predict other behavioral acts of the agent who possesses the explanatory disposition D. Let's now, for the sake of simplicity, take into account the following prediction about John's understanding of Mary's intentions in the same situation S:

C: 'John attributed hostile intentions to Mary.'

Then the explanation of C would be:

E2*: 'John attributed hostile intentions to Mary when she provoked him because John is aggressive.'

In order to view E2* as a valid causal explanation, the following inequality must hold:

(4.2) $P(C, S|D) > P(C, S|\text{non-}D)$

If both (4.1) and (4.2) are satisfied, taken together, they imply that D is a common cause of B and C. Being a common cause, D screens off the correlation between its two manifestations. However, the correlation between B and C is the only empirical fact we know for sure. There is a plenty of evidence e.g. for the existence of a direct connection between the various

[8] The inferences that follow hold even if we use a different criterion for causal relevance. The probabilistic criterion has been chosen only because it is considered "disposition-friendly" (McKitrick 2005), i.e. it is not expected to bring additional problems for the causal construal of dispositional explanations.

[9] The inequality (4.1) should be read as follows: the probability of the appearance of B in S given D is higher than the probability of the appearance of B in S given non-D.

violent reactions to particular provocations and the attribution of a negative intention to the provocateur (see Dodge 2006). However, when we construe the dispositional explanations as common cause explanations, this construal forces us to assume that the correlations between the manifestations of the dispositional property are spurious rather than standing for real connections. On the other hand, there is little to no evidence that specific biological structures exist that might play the role of the alleged common causes of the correlated behavioral acts (see Kehoe et al. 2012). In addition, theoretical considerations have been raised against the plausibility of the hypothesis that such biological common causes of traits' manifestations exist.[10] The situation in personality psychology thus reminds us about the situation in quantum mechanics where the assumption that dispositional properties like the spin of an electron are grounded in (still unknown) categorical physical properties led to theoretical conceptions which are not supported by the available experimental evidence as well as by theoretical results such as the Bell's theorem.[11]

Nothing significantly changes if we use the E22 form of the explanation: 'John hit Mary because John is aggressive and Mary provoked him.' In this case the following equations must hold in order to construe E22 and E22* as causal explanations, in accordance with the disposition-friendly probabilistic criterion for causal relevance:

(4.3) $P(B|S, D) > P(B|S, \text{non-}D)$

(4.4) $P(C|S, D) > P(C|S, \text{non-}D)$

[10] Lamiell (1987) was probably the first who tried to draw attention to the fact that the behaviorally defined traits have been elicited using statistical methods such as factor analysis in between subject studies which do not allow us to infer that the elicited structure exists within the particular subjects; see also Rorer (1990); Borsboom et al. (2003); Cervone (2004); and Borsboom (2015). A different argument against the interpretation of traits as hidden causes of their observable manifestations was raised by Wiggins (1973). His argument builds on the premise that the considerations involved in drawing the boundaries between the different trait categories reflect some socially important distinctions rather than biological ones.

[11] A series of proofs known under the label "the Bell's theorem" demonstrate that local hidden variables cannot (causally) account for the quantum measurement correlations, which the quantum mechanics predicts – see Bell (1964); see Myrvold (2016) for a recent discussion on the Bell's theorem's implications.

Again, the common cause (S, D) screens off the correlation between B and C, which in this particular example is unacceptable for both empirical and theoretical reasons, as it was shown above. There is empirical evidence for the connection between hostile attributions and aggressive reactions to provocations and there is a theoretical model built on this evidence which has been well confirmed (cf. Dodge 2006). At the same time there is no convincing evidence that the alleged common causes stand for real biological structures and there are good theoretical arguments against such hypotheses.

4.2. The inferences to different objects (agents)

Let's go back again to the example E2: 'John hit Mary when she provoked him because John is aggressive' and remind that this dispositional explanation allows us to predict that another person, say Billy, who has the same dispositional property (has an aggressive personality) will act in a similar way B* in a situation S* which is similar to S.

Let's assume that B* stands for 'Billy offended Sally', S* stands for 'Sally provoked Billy' and D* stands for 'Billy is aggressive'. Then if we apply again the probabilistic criterion for causal relevance to the following dispositional explanation

E3: Billy offended Sally when she provoked him because Billy is aggressive

we'll receive

(4.5) $P(B^*, S^*|D^*) > P(B^*, S^*|\text{non-}D^*)$

As far as D* is similar but not identical to D (i.e. we do not have good reasons to assume that John's aggressiveness is exactly the same as Billy's aggressiveness), we cannot say that the two events (B, S) and (B*, S*) have a common cause, we can only say that they have *similar* causes. Therefore, we are not forced here to screen off the correlations between (B, S) and (B*, S*), but even if we were, that would not create any problem because no one expects a direct causal link between the events 'John hit Mary when she provoked him' and 'Billy offended Sally when she provoked him'.

To sum up, the causal construal of dispositional explanations leads to a common cause assumption only when we try to account for the inferences to different manifestations. In some of these cases the implied common cause assumption goes against the available empirical data and theoretical considerations. However, the causal construal does not lead to any serious problems when we interpret causally the inferences to different objects (agents). Probably because the causal account of dispositional explanations does not face serious problems most of the time, many are tempted to assume that it is generally tenable but it is not as the analysis of the causal construal of the inferences to different manifestations has shown.

One can ask at this point: but what are we left with when we abandon the causal construal of dispositional explanations for the reasons stated above? Or asking the same question in slightly different words, what in the end is the proper construal of dispositional explanations? In the next section I'll try to defend the view that dispositional explanations are better viewed as a distinct type of explanation, which has to be analyzed in terms of the extra-inferences (inferences to different manifestations and inferences to different objects/agents) that these explanations allow us to draw.

5. Dispositional explanations as a distinct type of explanation

The main views of scientific explanation in the philosophy of science today[12] set different requirements for the *explanans* and (or) for the relation between the *explanans* and the *explanandum* (see Table 1 below).

Dispositional explanations could not be easily subsumed under either of the views presented in Table 1. They, for example, do not explicitly refer to any laws and some dispositionalists (e.g. Mumford 2004) have even argued that they do not need to. Thus, unless we make some problematic stipulations, dispositional explanations could not be construed as covering-law explanations. We have already shown why, in some cases at least, dispositional explanations should not be treated as causal explanations. But

[12] See Skow (2016) for a recent review.

View on explanation	Requirements about the *explanans* and the *explanans/explanandum* relation
The covering-law model	The *explanans* contains at least one deterministic or probabilistic law or a law-like sentence. The *explanans* implies, deductively or inductively, the *explanandum.*
The causal theories	The *explanans* stands for events (states, processes etc.) which are causally relevant to the events (states, processes etc.) represented by the *explanandum.*
The unificationist view	The *explanans* implies, deductively or inductively, different *explananda.*

Table 1. The specific requirements for *explanans* and the *explanans/explanandum* relation that have been set by the three major views on explanation.

what about the unificationist account? On the one hand, dispositional properties do play a unifying role with respect to their different manifestations and thus an explanation which refers to such a property unifies different *explananda.* On the other hand, as Skow (2016) has already noted, unification seems to be a *consequence* of having an explanation rather than a *condition* that must be satisfied in order to have an explanation. Indeed, in the case of dispositional explanations, we must have an explanation already stated in either of the forms (2.1) or (2.2) in order to be able to draw the inferences to multiple manifestations that bring unification of different *explananda*. In addition, unification does not account for the specifics of dispositional explanations, e.g. for the important role of the stimulus conditions, as well as for the two types of extra-inferences that are constitutive for the explanatory benefits of dispositional explanations.

For the reasons stated above, it is safe to conclude that dispositional explanations are better viewed as a distinct form of explanation that satisfies the following conditions:

(i) The explanation can be presented in one of the forms (2.1) or (2.2), which means that the *explanans* must refer to a dispositional property D, and either the *explanans* or the *explanandum* must contain information about the stimulus condition S;

(ii) The explanation should allow for extra-inferences to different manifestations (3.1) as well as for inferences to different objects/agents (3.2) and these extra-inferences must have meaningful (and possibly true) interpretations.

The main advantages of the view that dispositional explanations form a distinct type of explanation, which satisfies the conditions (i) and (ii) are that this view makes salient the specific explanatory virtues of dispositional explanations and allows for analyzing and comparing different concrete explanations in terms of these virtues.

6. Conclusions

Dispositional explanations are most valued for the extra-inferences, which they allow for. The explanation of a particular phenomenon, or a behavioral act, which relates the explained phenomenon (behavioral act) to a particular disposition, allows us to predict that other manifestations of the same disposition may be expected in the same or in a different stimulus condition. Such predictions are called here "inferences to different manifestations". Dispositional explanations allow us to predict as well that a different object/agent possessing the same dispositional property will exhibit similar manifestations, i.e. they allow for what was called here "inferences to different objects/agents". The causal construal of dispositional explanations successfully accounts for the inferences to different objects/agents but it fails to account properly for the inferences to different manifestations. This is because the causal construal of dispositional explanations entails that the explanatory dispositions are common causes of their manifestations. As far as the common causes screen-off the correlations

between their effects, the common cause assumption leads to conclusions which, in some cases at least, are either unacceptable for theoretical reasons or incompatible with the available empirical evidence, or both. Such unfortunate consequences of the common cause assumption are a serious reason to argue that the causal construal of dispositional explanations should be avoided, or applied with a great caution, and that dispositional explanations are better and safely analyzed in terms of their specific inferential virtues which present them as a distinct type of explanation.

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