Where Grounding and Causation Part Ways: Comments on Jonathan Schaffer

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Abstract:

Does the notion of ground, as it has recently been employed by metaphysicians, point to a single unified phenomenon (the "Unity Hypothesis")? Jonathan Schaffer holds that the phenomenon of grounding exhibits the unity characteristic of a single genus. In defense of this hypothesis, Schaffer proposes to take seriously the analogy between causation and grounding. More specifically, Schaffer argues that both grounding and causation are best approached through a single formalism, viz., that utilized by structural equation models of causation. In this paper, I present several concerns which suggest that the structural equation model does not transfer as smoothly from the case of causation to the case of grounding as Schaffer would have us believe. If it can in fact be shown that significant differences surface in how the formalism in question applies to the two types of phenomena in question, Schaffer's attempt at establishing an analogy between grounding and causation has thereby been weakened and, as a result, the application of the Unity Hypothesis to the case of grounding once again stands in need of justification.

I. The Unity Hypothesis

Metaphysicians have recently found it useful to apply the notion of ground to a wide range of phenomena. Jonathan Schaffer, for example, cites the following cases, among others, as exhibiting genuine grounding connections:[1] the relation between true propositions and their truthmakers; the relation between higher-order (e.g., biological) and lower (e.g., physical) properties; the relation between complex truths (e.g., conjunctions) and simpler truths (e.g., their

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[1] In what follows, when I refer to Jonathan Schaffer's work, I have in mind "Grounding in the Image of Causation" (this volume), unless otherwise noted.

conjuncts); the relation between substances and their qualities or modes (e.g., an apple and its redness); as well as the relation between a non-empty set and its members. When presented with such an apparently heterogeneous collection of cases, however, one may legitimately wonder whether much of anything has been accomplished by subsuming these phenomena, and perhaps others as well, under a single general rubric of grounding. In response to this concern, it is not uncommon for proponents of grounding to respond that, by collecting the data in question together in this way, we have in fact gained a valuable insight, namely that a collection of correlations which might at first strike us as quite disparate in reality presents us with a *unified* phenomenon ("the Unity Hypothesis").[2]

But does the notion of ground, as it has been recently employed by metaphysicians, in fact point to a single unified phenomenon? I have argued (cf., Koslicki 2014) that the Unity Hypothesis is open to several interpretations of varying strengths. In its strongest form (the "single-species" interpretation), the Unity Hypothesis states that there is only a single specific grounding relation and it is exemplified in all cases which allegedly present us with grounding connections. A somewhat weaker version of the Unity Hypothesis (the "single-genus" interpretation) allows for distinct specific grounding relations, but posits that these distinct specific grounding relations fall under a single generic kind, viz., grounding. A yet weaker reading of the Unity Hypothesis (the "mere resemblance" interpretation) requires only that the distinct relations which go under the name, "grounding", exhibit various objective similarities.[3]

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[2] For an endorsement of the Unity Hypothesis, see for example Audi 2012, p. 689; Rosen 2010, p. 114; Schaffer 2009, pp. 376-377.

[3] An interesting fourth option, which is well worth exploring further, is identified in Cameron forthcoming. Cameron challenges grounding theorists to consider the possibility that

Schaffer holds that the phenomenon of grounding exhibits the unity characteristic of a

single genus. Given the many fairly obvious differences between the cases he classifies as

exhibiting genuine grounding connections, however, the question arises as to what Schaffer's

evidence is for thinking that his notion of ground in fact picks out a single genus, rather than a

looser assembly tied together merely by the presence of objective similarities. In his earlier work

on the topic (especially Schaffer 2009), Schaffer's conception of grounding was not sufficiently

fine-grained to differentiate his intended generic grounding relation from other well-founded

partial orderings, such as the relation, *is-a-substring-of*, when applied to a domain whose

minimal elements consist of the letters belonging to some alphabet. However, Schaffer now

proposes to strengthen his case in favor of the generic unity of grounding by taking seriously the

analogy between non-metaphysical causation and grounding.[4] (In what follows, I refer to non-

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alleged grounding connections might exhibit a kind of unity that is weaker than that associated
with the single-species or single-genus interpretation, but stronger than that associated with the
mere-resemblance interpretation. The kind of unity in question, which Cameron brings to our
attention, is that familiar from the Aristotelian notion of *"pros hen"* (or core-dependent)
homonymy. As is well-known, when Aristotle says of certain central philosophical notions (e.g.,
being) that they are said in many ways, he often takes the notion in question to apply in a primary
way to a certain central case (viz., substance) on which all the other applications of the notion are
in some way dependent. Cameron issues the following challenge to grounding theorists. If a
successful case cannot be made that alleged grounding connections fall under a single species or
a single genus, and grounding theorists wish to avoid the charge of mere equivocation, then
Aristotelian core-dependent homonymy ought to be considered as a possible fourth route towards
a successful defense of the Unity Hypothesis. In that case, however, additional work is required
of grounding theorists, since they must then establish that the notion of ground applies in a
primary way to a certain central case on which all other alleged applications of the notion of
ground are in some way dependent. To my knowledge, no extant account of grounding has
availed itself, or is even particularly conducive to, the idea that ground is a core-dependent
notion.

[4] I speak here of *non-metaphysical* causation, since some proponents of grounding,
including Schaffer himself, have taken grounding to be a kind of causation, viz., *metaphysical*
causation. I therefore employ the phrase, "non-metaphysical causation", to pick out a causal

metaphysical causation simply as "causation".) More specifically, Schaffer argues that (i) grounding and causation are similar with respect to their content, internal structure and external connections to surrounding concepts; that (ii) both grounding and causation are best approached through a single formalism, viz., that utilized by structural equation models of causation; and that (iii) both grounding and causation belong to a small elite group of dependence relations which have the power to back explanation. As a result, if Schaffer's more recent arguments are successful, the hypothesis that grounding presents us with a unified phenomenon has at least as much plausibility as the analogous hypothesis in the case of causation.[5]

In what follows, I will focus on the arguments provided by Schaffer in support of the second step needed to establish the intended analogy between causation and grounding, viz., that both notions are best approached through the lense of a single formalism, namely that utilized by structural equation models of causation. Below, I will present several concerns which suggest that the structural equation model does not transfer as smoothly from the case of causation to the case of grounding as Schaffer would have us believe. If it can in fact be shown that significant differences surface in how the formalism in question applies to the two types of phenomena in

determination relation which proponents of grounding would want to distinguish from whatever determination relation(s) these theorists intend to single out when they speak of grounding. For a very different construal of metaphysical causation, from within Aristotle's framework, see Koslicki forthcoming.

[5] Schaffer takes for granted, in his discussion, that the Unity Hypothesis is plausible for the case of causation. I will not challenge this claim, since my focus is on Schaffer's analogy between grounding and causation. Thus, I am willing to grant Schaffer's assumptions concerning causation, for the sake of the argument, and will call into question, in what follows, only Schaffer's claim that grounding and causation in fact behave analogously in relevant respects. However, another possible route towards weakening Schaffer's case in favor of the alleged generic unity of grounding would be to object to his assumption that causation exhibits at least the degree of unity indicative of the presence of a single genus.

question, Schaffer's attempt at establishing an analogy between grounding and causation has thereby been weakened and, as a result, the application of the Unity Hypothesis to the case of grounding once again stands in need of justification.[6]

II. Disanalogies between Grounding and Causation

II.1 Two Scenarios

To bring out some of the central disanalogies between grounding and causation, I will first consider a simple example which Schaffer uses to illustrate how he intends to apply the structural equation model to the case of causation.[7] In the scenario in question ("Scenario 1"), we are to assume that a rock's being thrown against a window is causally related to a window's shattering. To represent this scenario using the structural equation model of causation, we define first a signature, $S1=<U1,V1,R1>$, where U1 is a finite set of exogenous variables representing the independent (or initial) conditions, V1 is a finite set of endogenous variables representing the dependent conditions, and R1 is a mapping function which maps every variable in $U1 \cup V1$ to

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[6] For further discussion of the application of the Unity Hypothesis to the case of grounding, see also Wilson (2014), especially Section V, "Is Grounding Needed as a General Unifier of the Specific Grounding Relations?", pp. 567-575. Wilson considers (and rejects) the idea that the analogy between causation and grounding might serve as a possible route towards defending the unity of grounding (cf., Section V.iii, "Contrasting Grounding and Causation as Potential Unifiers", p. 575).

[7] Again, in line with my remarks in the previous note, I will, for the purposes of this discussion, grant Schaffer's assumption that the structural equation model does in fact yield a successful framework by means of which to approach causation, since I am currently concerned only with Schaffer's attempt at establishing an analogy between grounding and causation by way of the thesis that the structural equation model applies equally well to both cases. A further strategy by which Schaffer's proposed analogy between grounding and causation could be disputed would be to cast doubt on the successes he claims for structural equation approaches to causation.

either 0 or 1. In the scenario in question, U1 can be thought of as containing the variable, *Thrown*, which represents the event of the rock's being thrown against the window (as contrasting with the rock's not being thrown against the window); and V1 can be thought of as containing the variable, *Shatter*, which represents the event of the window's shattering (as contrasting with the window's not shattering). R1 maps *Thrown* to 1, if the event of the rock's being thrown against the window occurs; to 0 otherwise. Likewise, R1 maps *Shatter* to 1, if the event of the window's shattering occurs; to 0 otherwise. Secondly, to represent how the endogenous variable, *Shatter*, is to be evaluated as a result of the value assigned by R1 to the exogenous variable, *Thrown*, we define a linkage, L1=<S1,E1>, where S1 is the signature just specified and E1 is a set of structural equations which specifies which value is assigned to *Shatter* on the basis of the value assigned to *Thrown*. In this case, E1 assigns the value 1 to *Shatter*, if *Thrown* is assigned 1; and E1 assigns the value 0 to *Shatter*, if *Thrown* is assigned 0. Thirdly, to represent what actually happens in the scenario in question, we define an assignment, M1=<L1,A1>, where L1 is the linkage just specified and A1 is a function mapping *Thrown* to either 0 or 1, depending on whether the rock is in fact thrown. In the event that the rock is thrown, the value assigned to *Shatter* in the model in question is set to 1 as well.

Next, consider a second simple example Schaffer employs to illustrate how he takes the structural equation model to apply to an alleged case of grounding. In this scenario ("Scenario 2"), we are to assume that a shirt's being red (as opposed to blue) is grounded in the shirt's being maroon (as opposed to navy). We again define first a signature, S2=<U2,V2,R2>, where U2 is a set Schaffer labels "{*Determinate*}", V2 is a set Schaffer labels "{*Determinable*}", and R2 is the following mapping function: R2 maps *Determinate* to 1 if the shirt is maroon and to 0 if the shirt

is navy; and R2 maps *Determinable* to 1 if the shirt is red and to 0 if the shirt is blue. In alleged

cases of grounding, we are to think of the exogenous variable in U2 as specifying the

"fundamental" conditions (as opposed to the initial conditions, in the case of causation).[8]

Secondly, we define a linkage, L2=<S2,E2>, where S2 is the signature just specified and E2 is a

set of structural equations which specifies which value is to be assigned to the endogenous

variable, *Determinable*, on the basis of the value assigned to the exogenous variable,

Determinate. In this case, E2 assigns 1 to *Determinable* if 1 is assigned to *Determinate*; and 0 to

Determinable if 0 is assigned to *Determinate*. Thirdly, to represent what actually obtains in the

scenario in question, we define an assignment, M2=<L2,A2>, where L2 is the linkage just

specified and A2 is a function mapping *Determinate* to 0 or 1 depending on whether the shirt is

in fact maroon or navy. In the event that the shirt is maroon, the value assigned to *Determinable*

will be set to 1 as well in the model under consideration. This representation, in Schaffer's

words, encodes "how the shirt's determinate shade sets its determinable color" (Schaffer 2015,

Section 3.1, p. 16).

II.2 Evaluating the Variables

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[8] When Schaffer proposes to read the exogenous variables, in the alleged grounding
scenario at hand, as representing the "fundamental" conditions (as opposed to the initial
conditions, in the causal case), we must read him as having in mind *relative*, rather than *absolute*,
fundamentality. Grounding theorists tend not to think of such states of affairs as the shirt's being
maroon as absolutely fundamental, i.e., as a state of affairs which does not obtain in virtue of
some other more fundamental state of affairs' obtaining. Thus, in Scenario 2, the exogenous
variables should be understood as representing conditions which, relative to the scenario at hand,
are assumed to be *more fundamental than* the dependent conditions represented by the
endogenous variables; but they need not stand for conditions which are taken to be fundamental
absolutely.

In Scenario 1, the exogenous and endogenous variables can be understood to range over events (e.g., the rock's being thrown against the window and the window's shattering) which we can conceive of as either occurring or not occurring. What are the values over which the exogenous and endogenous variables range in Scenario 2? In what follows, I will interpret the variables in Scenario 2 as ranging over states of affairs (e.g., the shirt's being maroon and the shirt's being red) which we can conceive of as either obtaining or not obtaining. Given Schaffer's conception of grounding as a worldly relation which can back (but is not to be identified with) explanation, it is important here to construe the relata of grounding (e.g., states of affairs) equally as worldly entities with no admixture of linguistic, conceptual or otherwise representational content.

II.3 Determinate/Determinable Grounding and Massive Causal Preemption

In Scenario 1, we are to think of the values assigned to the variables, *Thrown* and *Shatter*, as events (viz., the rock's being thrown against the window and the window's shattering), which can either occur or not occur. If the first event consisting in the rock's being thrown against the window in fact occurs, then (so we are to assume) the second event consisting in the window's shattering occurs as well. Given the interpretation proposed in II.2, we will think of the values assigned to the variables in Scenario 2, *Determinate* and *Determinable*, as states of affairs (viz., the shirt's being maroon and the shirt's being red), which can either obtain or not obtain.

But now the following disanalogy between Scenario 1 and Scenario 2 surfaces, as these scenarios are represented by the above models. In Scenario 1, the contrast between the rock's being thrown against the window and the rock's not being thrown against the window

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corresponds to the values, 1 and 0, assigned to the exogenous variable, *Thrown*. (And the same

holds for *Shatter*.) In contrast, in Scenario 2, the exogenous variable, *Determinate*, is to be

assigned the value 1 if the shirt is maroon, and the value 0 if the shirt is navy. But the shirt's

being navy is itself a *distinct state of affairs*, numerically different from the state of affairs which

consists in the shirt's being maroon. Both states of affairs (viz., the shirt's being maroon and the

shirt's being navy) can be conceptualized as either obtaining or not obtaining. Moreover, there is

no direct link between the non-obtaining of one of these states of affairs and the obtaining of the

other: for if the shirt fails to be maroon, it is not thereby required to be navy instead, since all

other determinate shades of color are options for the shirt as well. (Similar remarks apply to the

evaluation of the endogenous variable, *Determinable*, as well.)

Given the aptness constraints Schaffer imposes on his models (cf., Section 2.4 for the

causal case and Section 3.3 for the case of grounding), the model representing Scenario 2 would

need to include *distinct variables* for the various states of affairs in question: e.g., an exogenous

variable, *Maroon*, representing the state of affairs of the shirt's being maroon; an exogenous

variable, *Navy*, representing the state of affairs of the shirt's being navy; an endogenous variable,

Red, representing the state of affairs of the shirt's being red; and an endogenous variable, *Blue*,

representing the state of affairs of the shirt's being blue. The contrasting values, 0 and 1, which

can be assigned to these variables, in each case, would correspond to each state of affairs in

question either obtaining or not obtaining.

In order to preserve the analogy between causation and grounding, then, Scenario 2 would

need to be modeled as follows. We define first the signature, S2*=<U2*,V2*,R2*>, where U2*

contains the exogenous variable, *Maroon*, V2* contains the endogenous variable, *Red*, and R2*

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is the following mapping function: R2* assigns 1 to *Maroon* if the shirt is maroon and 0 otherwise; and R2* assigns 1 to *Red* if the shirt is red and 0 otherwise. Secondly, we define a linkage, L2*=<S2*,E2*>, where S2* is the signature just specified and E2* is a set of structural equations which specifies which value is to be assigned to the endogenous variable, *Red*, on the basis of the value assigned to the exogenous variable, *Maroon*.   In this case, E2* assigns 1 to *Red* if 1 is assigned to *Maroon*; and 0 to *Red* if 0 is assigned to *Maroon*. Thirdly, to represent what actually obtains in the scenario in question, we define an assignment, M2*=<L2*,A2*>, where L2* is the linkage just specified and A2* is a function mapping *Maroon* to 0 or 1 depending on whether the shirt is in fact maroon. In the event that the shirt is maroon, the value assigned to *Red* will be set to 1 as well in the model under consideration.

The current representation of Scenario 2 differs from the earlier one in the following two main respects. First, the contrast class represented by the values, 0 and 1, is now to be understood as corresponding to one and the same state of affairs (e.g., the shirt's being maroon) either obtaining or not obtaining. Secondly, an assignment which sets *Maroon* to 0 (denoting that the state of affairs consisting in the shirt's being maroon does not obtain) must be assumed to be compatible with a whole range of alternatives, all of which are represented by means of distinct variables in the model in question, e.g., *Crimson* (representing the state of affairs consisting in the shirt's being crimson), *Navy* (representing the state of affairs consisting in the shirt's being navy), and so on.

There is now reason to doubt whether, given this second representation of Scenario 2, the model at hand actually encodes "how the shirt's determinate shade sets its determinable color", as Schaffer claims in the above cited remark. Given that *Maroon*'s being set to 0 leaves open,

for example, whether *Crimson* should be set to 1 in the scenario in question, E2* would in some cases generate the wrong results. After all, there are many different ways in which the shirt can be red, and the state of affairs represented by *Maroon* captures only one of these ways. It would therefore be incorrect to define E2* in such a way that it assigns 0 to *Red* whenever 0 is assigned to *Maroon*; for the scenario in question may be one in which the shirt is nevertheless red, only in some other way, e.g., by being crimson rather than maroon. This result presents a counterexample to Schaffer's slogan, "wiggle the ground, and the grounded wiggles" (Schaffer 2015, Section 3.2, p. 19): for in a case in which we "wiggle the ground" by imagining the shirt's color to be changed from maroon to crimson, say, it is not the case that thereby "the grounded wiggles" as well, since the shirt continues to be red, only in a different way.

In addition, a further general feature of the determinate/determinable link is not currently represented in the model in question. Unlike in the causal case, it is metaphysically necessary that the shirt always has some determinate and some corresponding determinable shade of color, regardless of which determinate shade of color the shirt in fact has.[9] Thus, if Schaffer's endogenous variable, *Determinable*, in Scenario 2 in fact did represent the state of affairs consisting in the shirt's exemplifying some determinable shade of color or other, its value would always have to be set to 1 (assuming that we are representing what is metaphysically possible), regardless of what value is assigned to the exogenous variable in question.

There are thus two main deficiencies in how the determinate/determinable link is

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[9] In contrast, in the causal case, we are dealing with contingently occurring events, viz., the rock's being thrown against the window and the window's shattering. Even the causal connection which obtains between the rock's being thrown against the window and the window's shattering is not *metaphysically* necessary, though it is perhaps governed by some other form of necessity, e.g., nomological necessity.

currently represented in the revised model just specified: first, the model fails to capture

adequately the specific dependence relation which obtains between a particular

determinate/determinable pair (e.g., the shirt's being maroon and the shirt's being red); and,

secondly, the model does not speak to the general dependence relation which obtains between

determinables and determinates of a certain kind (e.g., all determinate shades of color and their

corresponding determinables in general).

When the structural equation model is applied to an alleged case of

determinable/determinate grounding, the grounding scenario in question is in fact more aptly

compared to a causal scenario involving *massive causal preemption*, i.e., a scenario in which a

single effect can be brought about by multiple alternative causes, each of which is individually

sufficient to bring about the effect in question and each of which occurs only if none of the others

occur. As it stands, it is not clear, even in the causal case, how the structural equation model, as

described by Schaffer, would produce the correct results in a case of massive causal preemption.

At most, then, we are dealing with a situation in which a supposedly clear case of grounding is

comparable to a problematic case of causation, one which has led to headaches for extant

theories of causation including, by Schaffer's own admission, the structural equation model of

causation.

When Scenario 2 is represented in the revised way presented above, we notice

furthermore that, in an alleged case of determinate/determinable grounding, the "fundamental"

conditions represented by the exogenous variables are not truly independent of the so-called

"dependent" conditions represented by the endogenous variables. Rather, each determinable

shade of color (e.g., red) sets its own range of alternative possibilities, consisting of the

corresponding determinate shades of color (e.g., maroon or crimson or ...). The shirt can only

exhibit a certain determinable shade of color (e.g., red) by exhibiting one of the admissible

determinate shades of color (e.g., maroon or crimson or ...) which falls into the range of

alternatives set by the relevant determinable shade.

In contrast to the causal case, there are thus dependence relations running in both

directions in an alleged case of determinate/determinable grounding: a rigid dependence relation

connecting particular states of affairs, running from the shirt's exemplifying some determinate

shade of color (e.g., maroon) to its exemplifying the corresponding determinable shade of color

(viz., red); but also a generic dependence relation connecting the shirt's exemplifying some

determinable shade of color (e.g., red) to the shirt's exemplifying some one particular

determinate shade of color (e.g., maroon) which falls into the relevant range of admissible

alternatives (viz., maroon or crimson or ...) set by the determinable shade in question. If we take

the variable, *Color*, to represent the state of affairs consisting in the shirt's exemplifying some

determinable shade of color or other, then the laws governing metaphysical possibility (if there

are such laws) dictate that the value assigned to *Color* must always be 1 (assuming that colorless

shirts are metaphysically impossible). Given that it is metaphysically necessary that the value

assigned to *Color* is always 1, it is also metaphysically necessary that one of the variables, *Red*,

Blue, etc., be set to 1 as well. Whichever one of *Red*, *Blue*, etc. is set to 1, it then furthermore

follows with metaphysical necessity from this assignment that one of the variables representing

the more specific admissible possibilities falling into the range of alternatives in question, e.g.,

Crimson, *Maroon*, etc., is also set to 1, though it is not metaphysically necessary for any one in

particular, e.g., *Crimson*, to be set to 1. In order for a model to capture the general

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determinate/determinable link, the following two-way dependencies would need to be

incorporated in some fashion into the representation of the system in question as well:

(a)   Overall Generic Determinable Outcome:

It is metaphysically necessary that *Color* is set to 1.

(b)   Generic Downward Dependence (from endogenous to endogenous variables):

It is metaphysically necessary that one of *Red* or *Blue* or ... is set to 1.

(c)   Generic Downward Dependence (from endogenous to exogenous variables):

It is metaphysically necessary that, if *Red* is set to 1, then one of *Maroon* or

Crimson or ... is set to 1 as well.

(d)   Rigid Upward Dependence (from exogenous to endogenous variables):

It is metaphysically necessary that, if *Maroon* is set to 1, then *Red* and *Color* are

set to 1 as well.

The very fact that two-way dependencies, such as those illustrated in (b)-(d), are implied

by any particular determinate/determinable connection calls into question the applicability of the

structural equation model to this alleged case of grounding, since the aptness constraints imposed

on the model require that dependence relations run in only one direction, viz., from the

conditions represented by the exogenous variables to the conditions represented by the

endogenous variables, and not the other way around. Given the presence of such two-way

dependencies, the allegedly "fundamental" conditions are only recombinable with some

restrictions, contrary to what is required by the "free recombination" principle Schaffer imposes

on the exogenous variables (Schaffer 2015, Section 3.3, p. 21).

II.4 The "Non-Identity" Constraint

Finally, I want to consider the first aptness constraint Schaffer imposes on his models. In the case of causation (cf., Section 2.4), Schaffer's first aptness constraint ("Distinctness") requires that the values assigned to distinct variables must all correspond to *distinct* events in the system, where "distinctness" here is meant to rule out both numerical identity and mereological overlap between events. In the case of grounding (cf., Section 3.3), the first aptness constraint ("Non-Identity") requires only that the values of distinct variables correspond to *"non-identical"* entities in the system. "Non-identity" is meant to be a weaker condition than "distinctness", which is now defined as follows (Schaffer 2015, Section 3.3, p. 21):

> An entity, x, and an entity, y, are *"distinct"* if and only if (i) x and y are numerically distinct; and (ii) x and y are not *"connected by grounding"*, i.e., it is not the case that (a) x grounds y or (b) y grounds x or (c) x and y have a common ground z.

Entities, x and y, may be "non-identical" without also being "distinct", e.g., if one of the grounding connections mentioned in (ii) holds between x and y. For example, in the revised model proposed for Scenario 2 above, distinct variables (viz., *Maroon* and *Red*) are reserved for the state of affairs consisting in the shirt's being maroon and the state of affairs consisting in the shirt's being red, even though the two states of affairs in question do not satisfy the definition of *"distinctness"* just offered, since they are connected by grounding (viz., the shirt is said to be red in virtue of its being maroon).

Presumably, the earlier definition of "distinctness", operative in the causal case, as excluding both numerical identity and mereological overlap is no longer appropriate for the case of grounding, since some entities in a given system ought to be represented via distinct variables

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even though they overlap mereologically. For example, if states of affairs are conceived of as having merelogical constituents of some kind, then the states of affairs represented by *Maroon* and *Red* overlap, since they both have the shirt as a constituent.

But now the worry arises that the new formulation of the first aptness constraint creates a circularity which was not present in the application of the structural equation model to the case of causation.[10] Numerical identity and mereological overlap are not causal notions. Thus, when we are engaged in the evaluation of a causal scenario, reading "distinct" as neither numerically identical nor mereologically overlapping is not overtly question-begging. In contrast, reading "distinct" as neither numerically identical nor connected by grounding does appear to be problematic in the context of evaluating an alleged grounding connection. After all, according to Schaffer's advertisement, one of the benefits of applying the structural equation model to the case of causation is supposed to be that this approach can distinguish mere correlations from causal connections (viz., the availability of "discovery algorithms"). Thus, when confronted with a type of phenomenon, x, and a type of phenomenon, y, which are correlated (e.g., smoking and lung cancer), we may ask "Does x cause y?" and, ideally, the structural equation model of causation should generate the correct answer to this question. Similarly, given Schaffer's account, we should expect to be able to ask the analogous question in the case of grounding, "Does x ground y?", when confronted by a type of phenomenon, x, and a type of phenomenon, y, which are correlated in some way (e.g., maroonness and redness). Ideally, if Schaffer's analogy between causation and grounding is successful, we should be able to expect the structural

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[10] The threat of circularity cited here arises even when we take into consideration Schaffer's remarks concerning the non-reductiveness of the structural equation approach to causation or grounding.

equation model, when applied to an alleged case of grounding, to distinguish correctly between

the presence of a mere correlation and the presence of a genuine grounding connection. Given

this success condition, we should not be forced to specify at the outset whether x and y are

connected via some grounding connection, just as we should not be forced, in the case of

causation, to specify at the outset whether x and y are causally connected. If the initial set-up of

the model does require us to determine at the outset whether x and y are causally connected or

ground-theoretically connected, then the only open question left to be resolved by the application

of the structural equations in question concerns the *direction* in which causal or grounding

connection runs in the system at issue. I take it, however, that one of the main selling points of

the structural equation approach to causation and grounding was also meant to be the ability of a

particular model to detect the presence of a genuine causal or ground-theoretic connection.[11]

III. Conclusion

Given the foregoing remarks, we thus have reasons to believe that significant disanalogies

exist between causation and grounding. In particular, I have attempted to show that the

application of the structural equation model to both types of phenomena leads to very different

results: whatever the merits of the structural equation approach to the case of causation, its

application to the case of grounding is much less straightforward than Schaffer's attempted

analogy between causation and grounding leads us to believe. I thus part ways with Schaffer's

claim that, in applying the formalism utilized by structural equation models of causation to the

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[11] The presence of two-way dependencies in the grounding case cited at the end of the previous section furthermore creates problems for a model's success in predicting even the direction of the alleged grounding connection present in a given case.

case of grounding: "Mathematically nothing has changed, beyond the purely decorative matter of the labels on the variables" (Schaffer 2015, Section 3.1, p. 16). The application of a single formalism to both grounding and causation constitutes a crucial step in Schaffer's arguments in support of the unity of grounding. To the extent that this step can be blocked, the hypothesis that grounding exhibits the unity characteristic of a single genus is thereby once again called into question.

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