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Correlation and causality

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ABSTRACT: This paper provides an analysis of the argument from cause and effect and a comparison of its various types with the argument from correlation. It will be claimed that arguments from causality and from correlation should be treated as equivalent for argumentative purposes. The main advantages of this approach (theoretical economy and impact on the taxonomy of critical questions) as well as possible theoretical objections will be discussed.

KEYWORDS: causality, correlation, argument schemes, critical questions

1. MOTIVATION

This paper is part of a larger project that advocates for a monistic approach to the study of argument schemes. The central claim of this paper is that the main argument schemes usually classified under ‘causal argumentation' can be explained in terms of and reduced to other argument schemes.

Although not strictly necessary for the central claim of this paper, a short synopsis of the larger project will be useful for a clear location of the claim. This synopsis will be given in form of an introductory note, before advancing to the main argument of this paper.

There is a vast and very rich literature on argument schemes. In fact, the theoretical works since Perelman/Olbrechts-Tyteca’s Nouvelle Rhetorique (1958) that have been mainly devoted to this topic constitute a body of literature that is too large to be exhaustively treated at this place. Arguably some of the most important milestones of the study of argument schemes are the works of Perelman/Olbrechts-Tyteca (1958), Hastings (1962), Schellens (1985), Kienpointner (1992), Garssen (1997) and Walton et al. (2008). Beyond their significant differences, most of these works share a couple of important similarities: they offer a taxonomy of argument schemes or modes of reasoning that attempts to be exhaustive within the field of (defeasible) argumentation, and they order this taxonomy in a hierarchical way starting usually from three or four main groups. What is absent from these taxonomies is a clear attempt to reduce the main groups to a common origin or first source that could complete the hierarchy. Perelman and Olbrechts-Tyteca explicitly concede that “It would be possible with some plausibility to reduce all the classes of schemes to one of them, which would be considered fundamental, underlying all the others.” (Perelman/Olbrechts-Tyteca 1969: 192), but go on to reject this idea as contrary to the aim of their project.

Perelman and Olbrechts-Tyteca are probably right in their opinion that it is not necessary to reduce the argument schemes to their original source if one intends to build a mere descriptive taxonomy of modes of reasoning. As soon as one introduces normative
elements (most notably a list of critical questions to test the validity of an argument) into the taxonomy, however, the situation changes significantly. Since it is the sole purpose of scheme-dependent critical questions to find out if the argument scheme concerned has been successfully applied, it is necessary to understand all essential qualities of that scheme, the most important of which is its relationship to the original source that supplies the scheme with its normative force. Short of this, a list of scheme-dependent critical questions can at its best be only an intuitively plausible (and potentially practically useful) collection. It is accordingly not surprising that the main lists of scheme-dependent critical questions (e.g., Hastings (1962), Kienpointner (1996), Walton et al. (2008)) show large discrepancies.

Building a systematic list of scheme-dependent critical questions requires a clear definition of the necessary components of each scheme, which can be provided by a good, hierarchically organized taxonomy that informs about the distinguishing qualities of each scheme and its relationship to the source of its normative force. There are good reasons to believe that there is only one source for all argument schemes, and a number of added benefits would result for the theory of argument if the construction of a monistic argument scheme taxonomy were possible.

The main reason for assuming that all argument schemes ultimately derive their normative force from just one source is their observable effect. If different argument schemes utilized different normative sources, a person persuaded by analogy reasoning should encounter different effects than a person persuaded by authority or causality reasoning. In the extreme, one should even be able to experience a situation in which one is causally convinced of $p$ but analogically convinced of $\neg p$. Yet, while individual arguments might certainly lead to mixed results in the individual person, there are no indications that different argument schemes lead to qualitatively distinguishable results or independent dimensions that would be expected if argument schemes did not share one common source of their normative force. This observable effect is of course far from a conclusive proof that all argument schemes can be reduced to one source, but it is sufficient as a motivation for the attempt, especially in the light of the added benefits that a monistic theory of argument might offer.

Apart from the inherent desirability of a maximally simple explanation for the normative force of the better argument in line with Ockham’s razor, there are two main benefits of such a theory: it could help in the development of a more systematic (unified) taxonomy of argument schemes, and it would enable the creation of systematic lists of critical questions for each scheme. If there is only one source for the normative force of each scheme, then there must be a clear line of transference of that source. Identifying the line for each scheme will be a useful factor for determining the optimal position of that scheme in a taxonomy. It will also be a necessary component for listing the qualities that are essential to each scheme for the scheme to be reasonable, thereby also providing the inverse side: a complete and systematic list of critical questions.

I have proposed a candidate for the original source of the normative force of argumentation in an earlier paper (Hoppmann 2009). The ‘rule of similarity’ that could be used as a basis of such a taxonomy for the purposes of this paper could be phrased as: A reasonable person must ascribe essentially similar properties $p$ to essentially similar entities $E$.

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1 I would like to thank Markus Herrmann for pointing out that a core part of this rule is not just fundamental but tautologically true by definition: The essential similarity between $E$ and $E'$ can of course only be expressed by identifying certain common properties. A more precise version of the rule of similar-
One can immediately deduce two modes of reasoning from this rule: 1) reasoning from a certain property of E to a similar property (p(E) → p'(E)) and 2) reasoning from a certain property of E to the same property of a similar entity (p(E) → p(E')). Combining the two modes forms a third mode of reasoning: 3) reasoning from a certain property of E to a similar property of a similar entity (p(E) → p'(E')).

It is easy to see that those three modes can account for some of the most fundamental common argument schemes. For the purposes of this paper, mode 2 is the most interesting, as it accounts for arguments from analogy. Take a simple example: “Portugal and Croatia are similar in their essential aspects. It was good that Portugal entered the European Union. Therefore it would be good if Croatia entered the European Union.” This argument follows the form “entering the EU is good” (Portugal) → “entering the EU is good” (Croatia).

Deducing the argument from parts and a whole from the argument from analogy is trivial. All one needs to do is to combine a set of unifying qualities into a group and ascribe the corresponding properties to the group to reach the form “It is good for small, southern European countries with a Catholic heritage to enter the EU. Croatia is a small, southern European country with a Catholic heritage. Therefore it would be good for Croatia to enter the EU.” By interpolation, the argument from parts and a whole accounts for a wider set of arguments that are based on the relationship of two (or more) groups to each other, which can be visualized by simple Venn diagrams. These argument schemes are treated under different names in the literature. To avoid any misunderstanding, I will simply refer to them as Venn arguments in this paper.

In their simplest (inclusive) form, Venn arguments appear to be just an instance of classical syllogisms. They are, however, much richer than classical syllogistic in at least two aspects: a) they can distinguish between different quantities of overlap (in terms of classical syllogistic reasoning, the two arguments “It is a sheep, therefore it is (probably) white” and “It is a sheep, therefore it is (probably) black” are identical in form, whereas a Venn argument can distinguish between the strong defeasible first argument and the weak defeasible second argument) and b) they can distinguish between groups that are more or less essential for its members.

It is the purpose of this paper to show that causal argument schemes can also be reduced to Venn arguments and thereby to the second mode of the rule of similarity.

2. HYPOTHESIS

In a monistic approach to argument schemes, as indicated above, it must be possible to show that all individual schemes can—directly or indirectly—be deduced from one singular source. It will be assumed here that there is only a limited amount of main schemes within the field of defeasible reasoning or argumentation. The vast body of literature on

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2 I have argued in an earlier paper that this mode also accounts for the argument from authority (Hoppmann 2009).

3 Which of the shared qualities are considered essential is to no particular interest for this purpose. For the sake of simplicity I am using "small", "southern European" and "Catholic heritage" in the example, but they could easily be substituted with more detailed and fitting qualities.
argument schemes seems to mostly agree on the main argument schemes (argument from sign, argument from analogy, argument from comparison, argument from authority, causal arguments etc.), but disagrees on their details, names, and positions within the respective taxonomy. For many of those schemes it is rather trivial to show how they can be reduced to and explained by other schemes that are ultimately linked back to a single source, but for some other schemes this seems to be a harder task. One measurement of finding those hard combinations is the position they occupy in the main taxonomies in the literature. Schemes that are far apart in most of those taxonomies, or form one of the main branches of the taxonomy, would qualify as hard in this sense. Showing that even those ‘hard’ schemes can be integrated in a monistic approach is one of the main tasks that must be fulfilled in the creation of such an approach.

For the purposes of this paper I have chosen one of the combinations that seems hardest in this definition: the relationship between mere correlation of two groups of entities as expressed in a Venn argument and the argument from causality. Causal arguments form a main group in most taxonomies, and reducing them to Venn arguments would be a significant step towards creating a monistic taxonomy that is necessary for developing a more systematic theory of critical questions.

3. METHOD

Reducing the causal argument schemes to Venn arguments involves three steps: a) identifying the various subclasses of causal argumentation, b) explaining their function in terms of Venn arguments, and c) explaining existing lists of critical questions customarily associated with causal schemes in terms of the critical questions of Venn arguments. Step b) and step c) present a positive and a negative approach to this task, and taken together should offer a full picture of the relationship between causal arguments and Venn arguments.

“Reducing” one scheme to another in the sense used in this paper should not be misunderstood as a claim that all argument schemes are ultimately the same. Rather, it is used in the sense that there is only one source of normative force of reasonable argumentation, and that all schemes can be explained as special varieties of using that force. Consequently there can (and should) be significant differences between causal argument and Venn arguments, but those differences may not introduce a new normative source, but simply describe qualities that are used in identifying certain schemes.

4. KINDS OF CAUSALITY

The argument from causality is one of the most complex argument schemes and falls into a number of sub-schemes. Among the most important distinctions within causal reasoning are: a) the difference between reasoning from cause to effect versus from effect to cause, b) the relationships between the cause and effect – necessary versus sufficient causes as well as quasi-necessary and quasi-sufficient and other relationships, c) the distinction between normative and descriptive causal arguments – reasoning from the existence of a cause or effect to the existence of the other versus reasoning from the desirability of a cause or effect to the desirability of the other, and d) positive and negative reasoning – from the presence or desirability of a cause or effect to the presence or desirability of the other, versus from the absence or undesirability of a cause or effect to the absence or
undesirability of the other, as well as combinations of both. Kienpointner (1992: 330) lists additional distinctions within causal reasoning, such as the Aristotelian divisions between formal, instrumental, material and final causes, or the difference between explaining and predicting (Kienpointner 1992: 336), but those are of no consequence for our purpose.

While distinctions a) and b) are largely specific to causal reasoning\(^4\), distinctions c) and d) are of course found in most other schemes as well. They seem to lead to some additional complications in causal schemes however and should thus be recognized in treating the group of causal argumentation schemes. These distinctions act as dimensions of causal argument schemes that are arbitrarily combinable to form an individual argument scheme. Together they offer a fairly exact description of the main sub-schemes of causal reasoning. They easily cover the examples given in the literature about cause and effect reasoning and they also are sufficient to describe causal schemes that are sometimes treated separately, such as the ‘argument from waste’ (Perelman/Olbrechts-Tyteca 1969:§65; Walton 1996: 80ff.), the ‘argument from consequence’ (Walton 1996: 75ff.) or the ‘pragmatic argument’ (Perelman/Olbrechts-Tyteca 1969: §62). Others, such as the ‘argument from correlation to cause’ (Walton 1996: 71ff.; Walton et al. 2008: 173ff.) that are sometimes treated under the heading of causal reasoning, do not fall within this description because, while their argumentative aim is a causal connection, their argumentative mode is not causal. Grouping them under causal argument schemes is therefore somewhat misleading.

To illustrate how those four dimensions cover the full realm of causal schemes, it will be helpful to apply them to some of the most common examples used in the literature:

**Example 1:** “No peace and security (…) can ever be established or preserved amongst men so long as this opinion prevails, that dominion is founded in grace and that religion is to be propagated by force of arms.” (Perelman/Olbrechts-Tyteca 1969: 266)\(^5\)

Basic causal connection: violent propagation of religion (cause) leads to a state that is inconsistent with peace and security (effect).

a: Reasoning from effect (peace and security) to cause (violent propagation of religion).

b: The cause is claimed to be a sufficient condition for the negation of the effect.

c: Normative reasoning from the undesirability of the effect to the undesirability of the negative cause.

d: Negative reasoning from the presence of a cause to absence of an effect.

**Example 2:** Augustus, when the inhabitants of Tarraco reported that a palm had sprung up on the altar dedicated to him, replied ‘That shows how often you kindle fire upon it’” (Perelman/Olbrechts-Tyteca 1969: 271).\(^6\)

Basic causal connection: fire on altar (cause) leads to a state that is inconsistent with new plants growing (effect).

a: Reasoning from effect (new palm) to absence of cause (sacrifices).

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\(^4\) a) and b) are independent dimensions but in practice partially interrelated because some relationships between cause and effect allow for a valid inference from cause to effect and other for a valid inference from effect to cause.


\(^6\) From Quintilian, VI, iii, 77.
b: The cause (sacrifices) is claimed to be a sufficient condition for the absence of the effect (new palm).
c: Descriptive reasoning from existence of effect to non-existence of effect. 7
d: Reasoning from presence of an effect to the absence of a cause.

Example 3: “The Free World as a whole is growing in military strength every day. In the United States, Western Europe, and throughout the world, free men are alert to the Soviet threat and are building their defenses. This may discourage the Communist rulers from continuing the war in Laos – and from undertaking new acts of aggression” (Hastings 1962: 167 f.).

Basic causal connection: military deterrence (cause) leads to a reduced probability of wars (effect).
a: Reasoning from cause (increased military strength in the west) to effect (end of war).
b: The cause is claimed to be a quasi-sufficient or at least a relevant condition for the effect.
c: Descriptive reasoning from the existence of the cause to the probable future existence of the effect.
d: Positive reasoning from the presence of a cause to presence of an effect.

Example 4: “When nations do not remain consistent in their policies, their prestige drops. Recognition of Communist China means not remaining consistent in our policies. Recognition of Communist China means that our prestige is likely to drop“ (Walton 1996: 74). 8

Basic causal connection: Policy inconsistencies (cause) lead to drop of national prestige (effect).
a: Reasoning from effect (drop of prestige) to cause (inconsistencies).
b: The cause is claimed to be a quasi-sufficient or at least a relevant factor for the effect, (but likely not understood to be sufficient).
c: Normative reasoning from the undesirability of an effect to the undesirability of a cause. 9
d: Negative reasoning from undesirability of an effect to undesirability of a cause.

Example 5: “There can be little question that, (…), mandatory retirement results in serious detriment to the appellants’ working lives, including loss of protection for job security (…)” (Walton 1996: 75f.). 10

Basic causal connection: Mandatory retirement (cause) leads to detriments in working lives (effect).
a: Reasoning from effect (detriments) to cause (mandatory retirement).

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7 The cause is of course undesirable, but the argument itself is merely descriptive.
9 Note that at face value this seems to be a descriptive argument but the context makes is very clear that what is argued for here is not a prediction of the likely outcome but an advise for the right action to be taken.
10 From Motherwell and Fraser (1990: A1).
b: The cause is claimed to be a quasi-sufficient or at least a relevant factor for the effect.
c: Normative reasoning from the undesirability of an effect to the undesirability of a cause.
d: Negative reasoning from undesirability of an effect to undesirability of a cause.\textsuperscript{11}

Example 6: “Here are some tracks that look like they were made by a bear. Therefore, a bear passed this way” (Walton et al. 2008: 170).

Basic causal connection: Walking bears (cause) leave tracks (effect).
   a: Reasoning from effect (bear tracks) to cause (passing bear).
   b: The cause is claimed to be quasi-necessary for the effect.
   c: Descriptive reasoning to explanation or earlier happenings.
   d: Positive reasoning from presence of effect to presence of cause.

Example 7: “If the consumption of state-of-the-art medication should be judged positively, then the resulting effect should also be judged positively” (Kienpointner 1992: 340)\textsuperscript{12}

Basic causal connection: Good medication (cause) leads to good medical results (effect).
   a: Reasoning from cause (medication) to effect (changes in health).
   b: The cause is claimed to be quasi-sufficient or at least relevant for the effect.
   c: Normative reasoning from desirability of cause to desirability of effect.
   d: Positive reasoning from value of cause to value of effect.

The above examples illustrate how the different kinds of argument schemes grouped under “causal reasoning” can be expressed in terms of the four main dimensions: a) direction (cause-effect vs. effect-cause), b) relationship 1 (necessary vs. sufficient etc.), c) kind of property (normative vs. descriptive) and d) relationship 2 (positive vs. negative reasoning). Each of the combinations of these dimensions is theoretically possible, but some are naturally more frequent than others because they allow for a stronger argument.

The task of positively deducing the full spectrum of causal argument schemes from Venn argument schemes accordingly entails an explanation of each of these dimensions in terms of Venn arguments.

\textsuperscript{11} Note that although example 4 and example 5 are listed as instances of two separate argument schemes in Walton, their analysis shows an identical structure.

\textsuperscript{12} Scheme (47): „Wenn der Konsum von Medikamenten auf dem neuesten Stand der Forschung positiv zu bewerten ist, sind auch die Wirkungen positiv zu bewerten.”
direction | relationship 1 | kind | relationship 2
--- | --- | --- | ---
Example 1 | effect-cause | neg. suf./incons. | normative | pos-neg
Example 2 | effect-cause | neg. suf./incons. | descriptive | pos-neg
Example 3 | cause-effect | qu.-sufficient | descriptive | pos-pos
Example 4 | effect-cause | qu.-sufficient | normative | neg-neg
Example 5 | effect-cause | qu.-sufficient | normative | neg-neg
Example 6 | effect-cause | qu.-necessary | descriptive | pos-pos
Example 7 | cause-effect | qu.-sufficient | normative | pos-pos

TABLE 1: Overview of examples and their dimensions

5. POSITIVE RELATIONSHIP - REDUCING CAUSAL ARGUMENT SCHEMES

One of the great features of Venn arguments is their ease of visualization. Each kind of Venn argument resembles a specific relationship between two (or more) groups. I will make use of that feature in this section by equating the dimensions of the causal argument schemes above directly with the visualization of Venn schemes, rather than with their verbal counterpart, and address complications that might arise in each of those reductions. For this purpose the Venn element that represents the cause will be symbolized by a circle and the effect by a square.

With regards to causal argumentation there are six main forms of Venn arguments that represent the underlying relationships between ‘cause’ and ‘effect’ that must be assumed whenever making any argument from causality. They accordingly represent dimension b) (relationship 1) above. Each of these relationships allows for different combinations of dimensions a) and d) above. There are eight of those combinations in total and each of them can in turn be distinguished into a strong (irrefutable) or weak (defeasible) form. I will deal with the remaining dimension c) below.

The forms of Venn arguments can be visualized as follows:

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Dimension a) distinguishes between two options and dimension d) between four. The results leaves the combinations 1) from positive cause to positive effect, 2) from positive cause to negative effect, 3) from negative cause to positive effect, 4) from negative cause to negative effect, 5) from positive effect to positive cause, 6) from positive effect to negative cause, 7) from negative effect to positive cause and 8) from negative effect to negative cause. The words „cause“ and „effect“ are used to denote the two groups in questions. In some of the combinations the „cause“ is not directly responsible for the „effect“, but on the contrary causes a state that is inconsistent with the „effect“. I use „positive“ and „negative“ here rather than „existence“ or „absence“ to maintain the ambivalence that allows for both normative and descriptive causal arguments.
This relationship between cause and effect allows for strong arguments from positive effect to positive cause and from negative effect to negative cause. None of the sample arguments from above follow this pattern.

This relationship permits similar types of causal arguments, but the resulting arguments will be weaker. This is usually expressed as by a qualifier of the type “everything being equal”, “under normal circumstances” or “in most cases”. Depending on the quantity of overlap between the ‘cause’ and ‘effect’ groups, the argument can vary in degrees of strengths down to a weakness that would frequently be considered fallacious or invalid in the literature. Example No. 6 (Walton’s bear argument) follows this pattern.
This relationship allows for strong arguments from positive cause to positive effect and from negative effect to negative cause. None of the examples above follow this pattern.

Again this relationship allows for the weaker counterparts of the same two causal argument schemes from positive cause to positive effect and from negative effect to negative cause. Examples No. 3 (Hastings’ military deterrence), No. 4 (Walton’s Communist China), and No. 5 (Walton’s mandatory retirement) follow this pattern of reasoning.
This relationship allows for strong arguments from positive cause to negative effect and from positive effect to negative cause. Examples No. 1 (Perelman/Olbrechts-Tyteca’s religious propagation) and No. 2 (Perelman/Olbrechts-Tyteca’s Augustus’ altar) are of this type.

Similarly, the final relationship allows for weak arguments of the same schemes, from positive cause to negative effect and from positive effect to negative cause. None of the above examples fits this pattern.

With respect to the remaining dimension (c: kind of property), there is no significant difference between normative and descriptive kinds of argument. The comparison with Venn argument schemes illustrates that the crucial quality of each of those arguments is the relationship between two groups (‘cause’ and ‘effect’). Given a certain rela-

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14 In the given framework there is no relationship that allows for the remaining two potential forms (No. 3 and No. 7 above): from negative cause to positive effect and from negative effect to positive cause. This very rare potential form would require a binary framework in which the “cause” group and the “effect” group do not overlap and together cover a third group of all possible states. This relationship could still be expressed in form of a Venn argument but it seems negligible for the questions under consideration.
tionship (illustrated in the six figures above), positive or negative properties can be transferred in one direction (cause → effect) or the other (effect → cause). These properties can be descriptive (“the cause exists, therefore the effect exists” / “the cause is possible, therefore the effect is possible” etc.) or normative (“the cause is laudable, therefore the effect is laudable” / “the cause is desirable, therefore the effect is desirable” etc.). As a central distinction between different kinds of causal arguments, the difference between normative and descriptive reasoning should accordingly not be taken as decisive for creating sub-schemes. This observation comes with an important caveat, however: examples of normative arguments from cause to effect are strikingly rare in the literature on argument schemes. One of the few examples is Kienpointner’s medication argument (example 7 above), which at closer inspection is a somewhat weak argument. Why is reasoning from the positive value of a cause to the positive value of an effect so rare and the existing examples so weak? Given the parallel structure of normative and descriptive causal reasoning and the ease of finding strong descriptive cause-effect arguments (e.g. Hastings’ example 3 above) this seems to constitute a problem.

This argument type assumes that the positive value of a sufficient or - everything else being equal - quasi-sufficient cause can be transferred onto the effect. Two reasons can be identified that account for why this is rarely possible in real life argumentation. The first reason is shared by normative and descriptive quasi-sufficient cause-effect argument: Everything else is indeed rarely equal. ‘Effects’ will often be brought about by more than one ‘cause’ and the other ‘cause’ or ‘causes’ can spoil the quality that is to be transferred. The second reason, which is particular to normative cause-effect arguments, is the more important one: in order for a successful transference of a normative quality from ‘cause’ to ‘effect’ to be possible, the cause must have its value independent of its possible and real effect. In most value systems that is a very rare condition. While there might be values that are claimed to be positive (or negative) per se, even those are usually reconfirmed by positive (or negative) effects. It takes at least a deontological ethical system or even an absolutist moral to escape this problem. As long as one has consequentialist elements in the value concerned, the quality of the effect itself will override the argumentative transference from the cause. Whenever this condition is fulfilled, however, normative and descriptive cause-effect arguments are indeed structurally equivalent.

On a level of first approximation there seem to be clear Venn argument counterparts for all kinds of causal reasoning that have been distinguished above. Before claiming a success in the reduction of causal arguments to Venn arguments, it is necessary, however, to address two of the evident objections to this reduction: 1) cause and effect relationships include a clear chronological order, and Venn relationships do not necessarily include this quality, and 2) there are famous and well discussed intuitive counterexamples of strong correlations that should certainly not be called cause and effect.

1) The first point is indeed not an objection but rather an important qualification. Reducing causal arguments to Venn arguments only means that all causal schemes can be expressed as Venn schemes but not vice versa. It is accordingly no problem to concede that causal schemes have an additional quality that is not found in other Venn schemes, the quality that one of the Venn groups concerned (the ‘cause’) cannot be later than the other (the ‘effect’). Similar to other large main groups of argument schemes, Venn schemes fall into at least two subgroups, those with a fixed chronological order (‘causal argumentation’) and those without such a fixed order (‘argument from part and whole’
This distinction between general Venn arguments and the particular Venn arguments that are referred to as ‘causal arguments’ will be reflected in the critical questions that can be assigned to each scheme. These will be discussed in the next section.

2) In discussions about the difference between positive correlation and causal relationships some examples are frequently recurring. The purpose of these examples is to show that a correlation even in the right chronological order is not sufficient to allow causal inferences. Instances in which this is nevertheless attempted are labeled post hoc ergo propter hoc fallacies. There is indeed a difference between correlations that are strong enough to warrant reasonable arguments (such as the examples 1 to 7 above) and others that are not. This distinction is however not the difference between ‘real’ causal connections and ‘mere’ correlations that is frequently claimed. It will be helpful to take a closer look at two of the most famous examples of ‘non causal correlations’ frequently used: the storks and babies correlation and the books and child development correlation.

Storks and babies: ‘Storks bring babies, because whenever the stork population in a given region or country declines, a drop in birthrate will follow soon’. This argument has reached such an infamous status that it even triggered affirmative mock research, which analyzes the empirical data behind it.

Books and child development: This correlation has been brought to prominence by Levitt and Dubner (2005: Ch. 5), who dedicate a large discussion in their book *Freakonomics* to it. It can be summarized as ‘Children who grow up in a household with a significant amount of books develop better reading skills at a younger age’. This relationship has been used as a basis for the argument of the former governor of Illinois that ‘Sending young children a monthly book will improve their reading skills’. In both cases the problem is similar. There is a strong and empirically tested correlation between group x and group y, and group x is chronologically prior to group y, yet treating group x as ‘cause’ for group y is false.

This situation creates a challenge for the argument advanced in this paper. Namely, if causal arguments are nothing more than Venn arguments with a particular chronological structure, then how does one distinguish between notoriously weak arguments (like the stork/baby argument and the book/reading argument above) and reasonable causal argumentation?

There are two aspects to that challenge that deal respectively with the effects of causal reasoning and with the relationship expressed in the underlying correlation.

Causal reasoning is based on the ability to transfer assent to a proposition from one state (‘cause’ or ‘effect’) to the other. For that purpose one only has to assume that in a significant amount of cases the ‘cause’ predates the ‘effect’ or the ‘effect’ follows the ‘cause’. While there might be philosophical differences between a mere strong correlation and a causal link, for the purposes of argumentation it is irrelevant why one state usually follows the other. Consider the hypothetical scenario: There is a supreme being, completely detached from rules of causality, who out of her own free will chooses to improve the harvest of her followers whenever they make regular sacrifices to her. Her ac-

\[\text{From a philosophical standpoint there is some doubt that this quality is strictly necessary for causal relationships, but this question is not decisive for the purposes of argumentation. Comp. Faye (2010)}\]

\[\text{Comp. for this point also Burbidge (1990: 88f).}\]

\[\text{Comp. Höfer et al. (2004: 88ff).}\]
tions are not caused by the sacrifices, but they happen every time. It would be prudent to employ causal reasoning for her followers and make sacrifices (‘cause’) if they desire a good harvest (‘effect’). This reasoning would be sound until the goddess starts behaving erratically, in other words, until there is no strong correlation between one state and the other anymore. The existence of a ‘real’ underlying cause and effect relationship is irrelevant for the purposes of valid reasoning as long as the correlation is dependable.

This dependability is of course exactly the problem that exists in the underlying relationship in the stork/baby and the books/reading examples. In both cases there is a third element (a ‘common cause’) that is responsible for an earlier effect and a later effect. In the case of the stork/baby argument, this common cause is industrialization, which first reduces stork habitats and then brings social changes. In the case of the books/reading argument, it is the educational background of the parents that first makes them more likely to buy books and later creates an atmosphere of appreciation for reading skills beneficial for child development. The existence of this common cause creates a correlation between the two states that only remains as long as the common cause is in place. If, for example, in a preindustrial society, storks became a delicacy, then the extensive stork hunting would almost certainly have no effect on the birth rate in that society. The problem with the two examples is accordingly not one of missing causal relationship, but rather of erratic correlation.

This is true even if all observed instances of the false cause and the false effect had shown a relevant correlation and even if the sample in question was large enough. The decisive correlations that must be stable for the argument to be strong are not just all past cases, but rather all possible cases. This is where the two arguments above fail. Hastings’ distinction between correlation and causality addresses the crucial point: “We attempt to reduce correlations to more basic, elemental correlations until we have arrived at correlations which we would title causal, and if correlations can not be related to such factors, we do not really consider them causal relationships.” (Hastings 1962: 144) From this observation he concludes that there is a significant difference between correlation and causality. This conclusion is somewhat surprising because his observation points to the exact opposite result. The fact that a causal relationship can be gradually reduced from a correlation shows that there is a mere quantitative difference and no qualitative distinction. Of course one may chose to label a correlation ‘causal’ at any particular step of the gradual reduction, but this will be an arbitrary choice with no definitive significance. Simply speaking of ‘stronger’ or ‘weaker’ correlations would be more precise and less misleading in this context.

The key problem with the stork/baby argument and the books/reading argument as well as all similar apparent counterexamples is not the lack of the ‘real’ causal relationship, but the more fundamental deficit in the correlation either in observed events or in possible events. This deficit can be ruled out by reducing the observed correlation to a chain of simpler correlations that are better understood and for which the observed basis is larger. Calling any level of reduction a ‘causal relationship’ should not be misunderstood to mean anything else then a ‘particularly strong correlation with a chronological order between the two states’.

The positive reconstruction has shown that all kinds of causal argument can be reduced to strong correlation as expressed in the six figures of Venn arguments without a significant
loss. The only additional qualification one needs to distinguish the causal sub-schemes from other kinds of Venn arguments is a specific chronological order between the ‘cause’ and the ‘effect’. If this reduction of causal schemes to Venn schemes is correct, it should also reflect in an inverse reconstruction that looks at the critical questions attached to each scheme rather than at the scheme itself.

6. NEGATIVE RELATIONSHIP—REDUCING CRITICAL QUESTIONS

Scheme-dependent critical questions are tools for testing arguments for their validity by enumerating all qualities that are essential for that scheme. As such, they can be understood to be the negation of the scheme in question. If the causal argument schemes can be reduced to Venn arguments with an additional quality (chronological order of cause and effect) then the critical questions attached to each scheme must be reducible in a similar manner.

The theory of critical questions is considerably less developed than the theory of the schemes themselves. Some of the fundamental works on argument schemes, such as Perelman/Olbrechts-Tyteca’s New Rhetoric or Kienpointner’s Alltagslogik, do not contain critical questions at all. Others offer intuitive lists that are often incomplete and sometimes mix scheme-dependent product questions with scheme-independent process questions. In the case of causal argumentation, this situation is further complicated by the joint treatment of various sub-schemes in one chapter for which only one set of critical questions is offered. Accordingly there is a great variety of different lists of critical questions for causal argumentation that need to be carefully analyzed in an attempt to reduce them. Nevertheless it will be assumed that taken together, existing lists in the literature on causal argument schemes offer a fairly close approximation that can be used fruitfully for a verification of the relationship between causal arguments and Venn arguments.

On the other side, the critical questions attached to Venn arguments are very simple. They only need to test three things: 1) that there is indeed assent to group x having the proposition p, 2) that group x and group y overlap in the assumed way, and 3) that the proposition is kept stable in the process of transferring it from group x to group y (testing against a naturalistic fallacy). The first and third question will remain identical for all six figures of Venn arguments, whereas the second question depends on the particular relationship expressed in each figure. To acknowledge the particular qualification of causal kinds of Venn arguments one may add a fourths critical question concerning the chronological order, which only applies to this particular kind of Venn arguments. Divided up into the figures this leads to the following lists of critical questions for Venn arguments:

Figure 1:

1. Does group x have proposition p?
2. Are all members of group y also members of group x? / Is there no y that is not x?
3. Is the proposition expressed in group x the same as the one expressed in group y?
4. (Is group x chronologically prior or synchronous to group y?)
Figure 2:
(1) Does group x have proposition p? (cause-effect) / Does group y have proposition p? (effect-cause)
(2) Are most members of group y also members of group x? / Is there only a negligible amount of y that is not x?
(3) Is the proposition expressed in group x the same as the one expressed in group y?
(4) (Is group x chronologically prior or synchronous to group y?)

Figure 3:
(1) Does group x have proposition p? (cause-effect) / Does group y have proposition p? (effect-cause)
(2) Are all members of group x also members of group y? / Is there no x that is not y?
(3) Is the proposition expressed in group x the same as the one expressed in group y?
(4) (Is group x chronologically prior or synchronous to group y?)

Figure 4:
(1) Does group x have proposition p? (cause-effect) / Does group y have proposition p? (effect-cause)
(2) Are most members of group x also members of group y? / Is there only a negligible amount of x that is not y?
(3) Is the proposition expressed in group x the same as the one expressed in group y?
(4) (Is group x chronologically prior or synchronous to group y?)

Figure 5:
(1) Does group x have proposition p? (cause-effect) / Does group y have proposition p? (effect-cause)
(2) Are group x and group y completely separate? / Is there no instance of x also being y?
(3) Is the proposition expressed in group x the same as the one expressed in group y?
(4) (Is group x chronologically prior or synchronous to group y?)

Figure 6:
(1) Does group x have proposition p? (cause-effect) / Does group y have proposition p? (effect-cause)
(2) Are group x and group y mostly separate? / Is there only a negligible amount of instances of x also being y?
(3) Is the proposition expressed in group x the same as the one expressed in group y?
(4) (Is group x chronologically prior or synchronous to group y?)
If the claim defended in this paper, that causal arguments are just a specific kind of Venn arguments, is correct, then all of the critical questions offered in the literature must be either subsumable under the critical question for the particular Venn figure or explainable in other terms (such as, for example, not being product questions or not even critical questions in the strict sense at all). If neither is possible, the remaining critical questions likely point to weaknesses in the reconstruction. If, on the other hand side, the subsumption poses no problems, then the negative reconstruction confirms the positive reconstruction and the main argument above.

One of the earliest lists of critical questions is offered by Hastings in his dissertation. He provides four critical questions for the argument from cause to effect (Hastings 1962: 74 ff):

1. Does the cause have a valid causal relation with the effect?
2. How probable is the effect on the basis of the correlation?
3. Is the cause a sufficient cause to produce the effect?
4. Are any other factors operating to interfere with the production of the effect?

Since Hastings only discusses positive arguments from cause to effect in this chapter, the relevant Venn figures are No. 3 and No. 4 (for the strong form and the weak form of that argument respectively). We have to dismiss his first question for the purpose of this reconstruction because it presumes the exact opinion that is challenged in this paper. Since the main argument of this paper is that a causal relation is nothing more than a strong correlation, trying to reduce Hastings’ No. 1 would beg the question. The remaining three constitute no problem. No. 2, although atypically phrased as an open-ended question, is a functional equivalent of Venn fig. 4.2. Hastings here discusses the weak form of argument from cause to effect and tests the strength of the correlation. His No. 3 is the equivalent for strong arguments and accordingly corresponds with Venn fig. 3.2. The final question on Hastings’ list is not a critical product question at all, but what can be termed a ‘mirror question’; it does not, strictly speaking, test the individual argument but checks for available counterarguments of the same type. These mirror questions are frequently included in lists of critical questions out of convenience but are questioning a different part of the argumentative process. The counterpart to this question for Venn arguments is the “Is group x also part of group z to which –p can be attributed?” So even if one wanted to include mirror questions into a systematic list of critical product questions, Hastings’ last question could still be reduced to the critical questions associated with Venn arguments.

Walton offers two distinct lists of critical questions for arguments from cause to effect and from effect to cause (which he calls ‘argument from consequence’). (Walton 1996: 73 ff.)

For the sake of brevity, the analysis at this point will be limited to the former list, with the latter largely being its inverse counterpart. He includes three questions:

1. How strong is the causal generalization (if it is true at all)?
2. Is the evidence cited (if there is any) strong enough to warrant the generalization as stated?
3. Are there other factors that would or will interfere with or counteract the production of the effect in this case?

Later repeated in a nearly identical phrasing in Walton et al. (2008: 168ff, 328).
Like Hastings, Walton here treats positive cause to effect arguments, so the corresponding Venn arguments are once again figure 3 and figure 4. Walton’s No. 1 is roughly equivalent with Hastings’ No. 2, and questions the group relationship as expressed in the Venn critical question fig. 4.2 and fig. 3.2. His No. 2 is a specification of the same question that looks more detailed at the overlap of the groups concerned. In as much as this question also demands additional testimony for the relation, it requests additional arguments and would thus not be a product question but a process or sufficiency question. Walton’s final question is mostly a counterpart to Hastings’ No. 4, as long as one understands it as asking for additional causes or effects. If it merely questions whether this cause is one of the few instances (in figure 4) that do not lead to the effect, then it is a specification of Venn fig. 4.2 version 2: “Is there only a negligible amount of x that is not y?” In this case the question tests, if the amount is indeed negligible in this case.

Van Eemeren, Grootendorst and Snoeck Henkemans name only one critical question that they consider important for causal argumentation (van Eemeren et al. 2002: 101):

(1) Does Z always lead to Y?

Since they mainly discuss positive effect to cause reasoning in the section concerned, the exact counterpart to this question is Venn fig. 1.2.

The final list to be discussed in this paper is also the longest. Kienpointner includes 15 critical questions about the various forms of causal arguments in his Vernünftig Argumentieren. While he does distinguish between many different causal schemes, unfortunately he presents all of the critical questions without those distinctions. Due to the practical nature of his book, he also includes a number of questions that are not strict product questions. The questions he includes also cover most of Freeley and Steinberg’s (2000: 157 ff) list. His questions, in my translation, are as follows (Kienpointner 1996: 156 f.):

(1) Does the cause really (not) exist?
(2) Does the effect really (not) exist?
(3) Does the cause in question regularly lead to the effect?
(4) Is the effect absent whenever the cause does not exist?
(5) Could the effect have been brought about by other causes?
(6) Could the cause bring about additional effects?
(7) Should the effect (result of an action) really be judged to be positive?
(8) Should the effect (result of an action) really be judged to be negative?
(9) Do additional effects of the action in question exist?
(10) Do the negative effects outweigh the positive effects?
(11) Do the positive effects outweigh the negative effects?
(12) Should the aim of the action be judged to be disproportionally more important / positive than the means employed?
(13) Are the means employed the only ones that are available?
(14) Are there means available that should be judged more positively or less expensive?
(15) If there is only one means available, is it acceptable by general ethical standards? If not, may it be permissible as an exception in the given situation?

This list clearly reflects its having been made to cover numerous different positive and negative arguments from cause to effect and from effect to cause. Furthermore,
Kienpointner’s No. 6 and 9-15 include either process questions or treat situations with multiple cause-effect relationships and can be dismissed here. They could still be subsumed in a setting that covers a complete system of critical questions but such an analysis goes far beyond the scope of this paper. The remaining questions No. 1-5 and 7-8 can indeed easily be reduced to the Venn questions of different figures. Kienpointner’s No. 1 and No. 2 are the descriptive versions of the first critical question in any Venn figure (where ‘p’ equals ‘does exist’). His No. 7 and No. 8 are the normative version of the first critical question (where ‘p’ equals ‘is good’). Kienpointner’s No. 3 tests the sufficiency of the cause for the effect and is thus an exact counterpart to Venn fig. 3.2. His No. 4 and No. 5 both test the necessity of the cause for the effect and are accordingly exact counterpart to Venn fig. 1.2. In summary, even Kienpointner’s rather extensive list of critical questions for causal arguments can easily be explained in terms of Venn arguments.

While by no means exhaustive, the analysis of some of the most prominent lists of critical questions for causal arguments shows that the product questions linked to those schemes can be easily reduced to the product questions for Venn arguments with the addition of a chronological order question. As a side effect this reconstruction confirms the systematic lists of scheme dependent critical questions for causal arguments that underlies the various intuitive lists found in the literature. It can be immediately derived from the list of critical questions for Venn arguments and contains four questions:

1. (proposition questions): Does the ‘cause’ have the claimed proposition p? (cause-effect) / Does the ‘effect’ have the claimed proposition p? (effect-cause)
2. (relationship question): Is the relationship between cause and effect indeed as assumed (i.e. 1: necessary / 2: quasi-necessary / 3: sufficient / 4: quasi-sufficient / 5: inconsistent / 6: quasi-inconsistent)?
3. (naturalistic fallacy question): Is the proposition expressed in the ‘cause’ the same as the one expressed in the ‘effect’?
4. (chronological order question): (Is the ‘cause’ chronologically prior or synchronous to the ‘effect’?)

The last of these questions is considerably weaker then the first three, because a failure of the argument in this aspect might not weaken the argumentation at all, but rather just indicate, that either cause and effect are reversed (but might still allow for a similar argument) or that the argument might just not be causal but instead belong to a different type of (potentially fully reasonable) Venn arguments.

7. CONCLUSION

I have argued in this paper that causal reasoning is a subclass of Venn arguments. This claim has been defended by differentiating the argument schemes treated within causal argumentation and comparing them positively (as arguments schemes) and negatively (as critical questions) to Venn arguments.

The result points to an understanding of causal reasoning as very closely related to reasoning based on Venn group relationships. In fact, the only distinguishing criterion between any strong Venn argument and a causal argument is a particular chronological order that can be found in the latter. When attempting to define causal argumentation one
could use this additional quality as *differentia specifica* (with the *genus proximum* being Venn argumentation).

This result has a number of direct and indirect implications. Directly, it helps gain a better understanding of causal argument schemes and their place in a taxonomy of arguments. It is also useful in producing a more systematic list of critical questions for causal schemes. Indirectly, it is an important step towards defending a monistic theory of argument with positive implications for the systematic understanding of critical questioning.

REFERENCES


Commentary on “CORRELATION AND CAUSALITY”
by Michael Hoppmann

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1. INTRODUCTION

I thank Professor Hoppmann for his attempt to exhibit causal relations in graphic form and to show how correlation and causality are related. These are worthy goals.

These comments are based on what I thought I heard Professor Hoppmann say, and on a version of his paper that he did not read. He did not read a paper.

2. DIAGRAMS

Regrettably I had difficulty grasping the nature and significance of his diagrams, which he called “Venn Diagrams”, and have a few questions:

(A) A. Hoppmann diagrams are diagrams of statements or propositions, not arguments, although he calls them “Venn arguments”. What are they?

(B) Venn diagrams and Euler Circles were developed by John Venn and Leonhard Euler in order to help judge whether an argument is deductively valid. It is not clear to me how Hoppmann’s diagrams do that for a causal argument, or even how to judge whether a causal conclusion follows defeasibly. He gives no example of a diagrammed argument, with or without a judgment of its strength. Perhaps he would show with an example how these diagrams can be used to judge the strength of a causal argument.

(C) If the above is not a use of these diagrams, of what use are they? They are more difficult than ordinary words for me to use to express my causal claims (including the qualifiers).

(D) The six diagrams he supplied all have the form of generalizations. How would he diagram a sole singular causal claim, such as, “The passing of a bear caused these tracks”? There are no qualifiers like ‘always’, ‘usually, often’, ‘sometimes’ etc. in this statement. There could be a qualifier like ‘probably’ in such a claim, but Hoppmann’s diagrams are intended to show frequencies, and ‘probably’ is not a frequency.

(E) He claimed that Walton’s bear argument (Example 6) fits Diagram 2, but that argument is not a generalization. It might assume a generalization, which Diagram 2 could fit, “Passing bears often cause bear track-appearing marks”, or it might assume a different generalization, “Generally passing bears are the only cause of bear track marks”. Clarification is needed here. One is a general statement of sufficiency; the other of a loose general necessary condition.
(F) Diagrams 2 and 4 seem similar except in matter of degree. Both could fit both of the generalizations in the previous paragraph. For example, Diagram 2 could be used to show both a “quasi-necessary relationship” that holds usually, as he claims, but also a “quasi-sufficient relationship” that holds about half the time, which is the province of Diagram 4. I remind him that some causal relationships hold much less than half the time.

3. CORRELATION AND CAUSALITY

From the abstract in the program, and the lack of any kind of connection in his diagrams, I assumed that he would hold that causation and correlation are equivalent. However, he denies this, allowing that there can be correlation without causation. This can occur when (and only when) the correlation between the two variables is not perfect, or when the putative cause follows the effect in time. But of course very few correlations are perfect, even when the putative cause precedes the effect, so most correlations would fail his test, even those that are causal.

I wonder how he would deal with the rough correlation between barometer readings and the often subsequent occurrences of storms. Do falling barometer readings often cause storms?

Incidentally (to supplement my first-expressed concerns) this relationship appears to fit both Diagrams 2 and 4.

Ever since Hume, philosophers have been trying to reduce causality to some kind of correlation or constant conjunction, but have not been successful. Professor Hoppmann should not be discouraged if he does not succeed.
Reply to Robert Ennis

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1. INTRODUCTION

I would like to thank Professor Ennis for the time he has taken to read and comment on my OSSA 2011 paper “Correlation and Causality”. He raises a number of points that deserve a brief reply. In order to minimize the room for misunderstandings I will take the full written version of my paper, that he received before the conference and which is published in this volume as a basis for my comments and only refer to the oral presentation that was delivered during the conference when explicitly indicated. I will also keep my remarks as brief as possible in the interest of the reader. The structure of this reply follows the order of the questions raised in the commentary.

2. QUESTIONS AND REMARKS

(A) Question: “Hoppmann diagrams are diagrams of statements or propositions, not arguments, although he calls them “Venn arguments”. What are they?”

Reply: There are indeed two separate aspects: a) Relationships between propositions and b) arguments that use these relationships in the attempt to transfer audience assent from one proposition to the other. As indicated in the original paper: “Each kind of Venn argument resembles a specific relationship between two (or more) groups. I will make use of that feature in this section by equating the dimensions of the causal argument schemes above directly with the visualization of Venn schemes, rather than with their verbal counterpart, and address complications that might arise in each of those reductions.” I call arguments that are based on relationships which can be expressed in Venn diagrams “Venn arguments” in order to avoid obscurity due to conflicting terminology in the literature.

(B) Remark: “Venn diagrams and Euler Circles were developed by John Venn and Leonard Euler in order to help judge whether an argument is deductively valid. It is not clear to me how Hoppmann’s diagrams do that for a causal argument, or even how to judge whether a causal conclusion follows defeasibly. He gives no example of a diagrammed argument, with or without a judgment of its strength. Perhaps he would show with an example how these diagrams can be used to judge the strength of a causal argument.”

Reply: Since my paper is predominantly concerned with defeasible arguments it goes without saying that deductive validity is not required. Nor does the paper make any reference to or engage with the works of Venn and Euler beyond the use of the long popularized term “Venn diagram”. These diagrams are used to distinguish between six different types of correlation-based arguments that can help us understand the nature of causal reasoning. The strengths of each of the resulting arguments is assessed with the

help of a set of critical questions and it is precisely the purpose of this paper to make a contribution to the development of a more systematic theory of critical questions.

(C) Remark: “If the above is not a use of these diagrams, of what use are they? They are more difficult than ordinary words for me to use to express my causal claims (including the qualifiers).”

Reply: The purpose of the diagrams is to make assumptions about the relationship of a set of propositions explicit. These assumptions are usually unexpressed but crucial for the understanding of the different kinds of causal reasoning that lead to different sets of critical questions.

(D) Question: “The six diagrams he supplied all have the form of generalizations. How would he diagram a sole singular causal claim, such as, “The passing of a bear caused these tracks”? There are no qualifiers like ‘always’, ‘usually, often’, ‘sometimes’ etc. in this statement. There could be a qualifier like ‘probably’ in such a claim, but Hoppmann’s diagrams are intended to show frequencies, and ‘probably’ is not a frequency.”

Reply: I have no intention to diagram such a singular claim. As indicated in the paper, there is a clear distinction to be made between arguments that utilize a causal argument schemes (i.e. causal arguments) and arguments that attempt to establish a causal relationship in their claim (i.e. any kind of argument): “Others, such as the argument from correlation to cause’ (Walton 1996: 71ff.; Walton et al. 2008: 173ff.) that are sometimes treated under the heading of causal reasoning, do not fall within this description because, while their argumentative aim is a causal connection, their argumentative mode is not causal. Grouping them under causal argument schemes is therefore somewhat misleading.” By just looking at the claim, one has no means to identify the type of argument used. To take Ennis’ example: “The passing of a bear caused these tracks” is not an argument, but a claim. Of course it can be turned into an argument by adding a “I have seen the same kinds of tracks on another occasion after a bear had passed.” (argument from analogy) or “I have studied bear tracks for years and I have no doubt about these.” (argument from authority), etc. A similar distinction must be made for all kinds of arguments if one seeks to understand the structure of the underlying scheme.

(E) Remark: “He claimed that Walton’s bear argument (Example 6) fits Diagram 2, but that argument is not a generalization. It might assume a generalization, which Diagram 2 could fit, “Passing bears often cause bear track-appearing marks”, or it might assume a different generalization, “Generally passing bears are the only cause of bear track marks”. Clarification is needed here. One is a general statement of sufficiency; the other of a loose general necessary condition.”

Reply: The problem that Ennis has in verbally expressing a fitting generalization is one of the main reasons why diagramming the underlying relationship is often simpler and more intuitive than their verbal counterpart. Either technique can of course not entirely avoid the danger of misrepresentation that is inherent in argumentative reconstruction. In the case of Walton’s bear example (“Here are some tracks that look like they were made by a bear. Therefore, a bear passed this way.”). I have chosen to reconstruct the underlying relationship as a figure 2 diagram which could be (rather awkwardly) verbalized as: “There are possible states in which it is believed that a bear has passed [indicated
as a circle] and there are possible states in which it is believed that there are bear tracks [indicated as a square] and the majority of the former states coincide with the latter states and the vast majority of the latter states coincide with the former states.” Because most natural languages are not well equipped for expressing these kinds of relationships it is often useful to refer to visual diagrams for an easier understanding.

(F) Remark: “Diagrams 2 and 4 seem similar except in matter of degree. Both could fit both of the generalizations in the previous paragraph. For example, Diagram 2 could be used to show both a “quasi-necessary relationship” that holds usually, as he claims, but also a “quasi-sufficient relationship” that holds about half the time, which is the province of Diagram 4. I remind him that some causal relationships hold much less than half the time.”

Reply: Ennis’ observation is doubtlessly correct, these two diagrams are indeed similar “except in matter of degree”. But while “degree” might often be a qualification that is ignored by simpler kinds of formal logic, it is crucial for the understanding and evaluation of defeasible argumentation. To use the example discussed in the original paper: The arguments “‘It is a sheep, therefore it is (probably) white’ and ‘It is a sheep, therefore it is (probably) black.’” make use of underlying relationships between the groups a) all sheep and white sheep and b) all sheep and black sheep respectively, which are similar except in matter of degree, yet I hope that Ennis would agree with me that the two arguments (while both being defeasible) are quite different in strength and should be judged so by a reasonable person.

3. FURTHER REMARKS

(1) Remark: “From the abstract in the program, and the lack of any kind of connection in his diagrams, I assumed that he would hold that causation and correlation are equivalent. However, he denies this, allowing that there can be correlation without causation. This can occur when (and only when) the correlation between the two variables is not perfect, or when the putative cause follows the effect in time. But of course very few correlations are perfect, even when the putative cause precedes the effect, so most correlations would fail his test, even those that are causal.

I wonder how he would deal with the rough correlation between barometer readings and the often subsequent occurrences of storms. Do falling barometer readings often cause storms?”

Reply: I fear that Ennis here misunderstands the relevant section of my paper: “The fact that a causal relationship can be gradually reduced from a correlation shows that there is a mere quantitative difference and no qualitative distinction. Of course one may chose to label a correlation ‘causal’ at any particular step of the gradual reduction, but this will be an arbitrary choice with no definitive significance. Simply speaking of ‘stronger‘ or ‘weaker‘ correlations would be more precise and less misleading in this context.” Put in simpler term: Not all correlations are causal, but all causal relationships can be expressed as (strong) correlations.

To address his barometer example: The structure of this example is of course identical with the two fallacious examples discussed in the paper, which also ignore a common cause (in this case meteorological conditions) and thus mistake two correlating
effects for a cause and effect. Once again: Not all (strong) correlations are causal, but all causal relationships can be expressed as (strong) correlations.

(2) Remark: “Ever since Hume, philosophers have been trying to reduce causality to some kind of correlation or constant conjunction, but have not been successful. Professor Hoppmann should not be discouraged if he does not succeed.”

Reply: I thank Professor Ennis for his kind wishes, but must point out that my aims in this paper are very, very different from those of Hume and later philosophers. It is by no means my intention to enter the philosophical discussion about the nature of causality. My aim is significantly more modest: To show that the structure of a reasonable (defeasible) argument based on a strong correlation is identical to that of a reasonable (defeasible) causal argument and that accordingly both share the same place in a monistic taxonomy of argument schemes. As stated in the paper “While there might be philosophical differences between a mere strong correlation and a causal link, for the purposes of argumentation it is irrelevant why one state usually follows the other.”

This claim is considerably more modest, but if successfully defended it can be a useful contribution to the work on a systematic theory of critical questions.