

Causality, Human Action, and Experimentation: Von Wright's Approach to Causation in Contemporary Perspective

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Abstract

This paper discusses von Wright's theory of causation from *Explanation and Understanding* and *Causality and Determinism* in contemporary context. I argue that there are two important common points that von Wright's view shares with the version of manipulability currently supported by Woodward: the analysis of causal relations in a system modelled on controlled experiments, and the explanation of manipulability through counterfactuals - with focus on the counterfactual account of unmanipulable causes. These points also mark von Wright's departure from previous action-based theories of causation. Owing to these two features, I argue that, upon classifying different versions of manipulability theories, von Wright's view should be placed closer to the interventionist approach than to the agency theory, where it currently stands. Furthermore, given its relevance in contemporary context, which this paper aims to establish, I claim that von Wright's theory can be employed to solve present problems connected to manipulability approaches to causation.

This paper provides a reassessment of Von Wright's views on causation in the context of contemporary manipulability theories. Currently, manipulability-based approaches to causation have been gaining wide acceptance, particularly in the philosophy of science, while earlier accounts such as the ones by Collingwood, Gasking, and von Wright are acknowledged as precursors, owing their focus on the connection between causation and action. In my view, there are two aspects that deserve further emphasis when reading von Wright alongside present manipulability theories: the connection between causation and experimentation, and the counterfactual framework for defining causation through action, particularly the subsequent solution to the issue of unmanipulable causes. Regarding the former, I argue that in the context of early manipulability-based approaches to causality, von Wright is the first to connect causation understood as manipulability to

experimentation. His further considerations can be linked to the methodology of controlled experiments. This point renders von Wright's view significant in contemporary perspective, where experimentation and methodology play an important role in the debates around causality. Concerning the latter, I argue that the reliance on counterfactuals to explain manipulability, and to further account for unmanipuable causes, currently advocated by Woodward, can be traced to von Wright's work (as early as *Explanation and Understanding*, but more overtly in *Causality and Determinism*).

In what follows I propose a different mapping of von Wright's view in relation to both early and present developments of manipulability-based views. Consequently, I present von Wright's approach in connection to the general framework of manipulability theories (section 1), then discuss von Wright's views alongside Woodward's on causation and experimentation (section 2), and counterfactuals and unmanipuable causes (section 3). I further explain why these features of von Wright's approach have seemingly gone unnoticed thus far in the light of the requirements for theories on the metaphysics and epistemology of causation of the time (section 4).

1. Von Wright's theory as an early attempt to define causation as manipulability

On a very general formulation, a manipulability approach to causation holds that there is a causal connection between two relata (say, p causes q), if intervening, or acting to change p yields into corresponding changes in q . While there are several issues with defining causation or providing an account of causal explanation through manipulation, one pressing problem concerns unmanipuable causes. On this definition, the possibility of changing the effect variable seems to rest on the capacity of an agent to perform certain actions. Since there are cases where it is impossible for agents to intervene on causal relations (say, one cannot intervene on magmatic activity to see whether it has a causal influence on volcanic eruptions), approaches of this form need to explain how the connection between causation and manipulability holds for such examples. In the causation literature (Woodward, 2003, 2016) this is stated as one of the main issues to have prevented manipulability approaches from gaining wider acceptance earlier on. I discuss specific solutions to this problem by von Wright and Woodward in section 3.

With regard to specific formulations of manipulability, von Wright's view goes as follows: 'it is established that there is a causal connection between p and q when we have satisfied ourselves that by manipulating the one factor we can achieve or bring it about that the other is, or is not, there. We usually satisfy ourselves as to this by making experiments' (1971: 72). Previous approaches along similar lines were formulated by Collingwood (1938, 1940) and Gasking (1955). Both of these views are in line with the general statement of manipulability above. Collingwood builds his three senses of causation on a presupposition involving the concepts of efficient cause and final cause: '*the causa quod* (...) is a situation or state of things believed by the agent in question to

exist' and '*the causa ut* is a purpose or state of things to be brought about' (1998, orig. 1940: 292). Gasking defines causation as follows: 'A causes B if (...) events of the B sort can be produced by producing events of the A sort' (1955: 483).

Concerning the overall framework for manipulability, there are two important aspects relevant for my purposes here with respect to which von Wright's views diverge from both Collingwood and Gasking:

a) Causation is discussed in scientific context.

b) There is a connection between causation defined as manipulability and experimentation.

Both (a) and (b) are present in von Wright's 'experimentalist idea of causation' (1971: xiii).

By comparison, Gasking does not focus on science in particular, and, furthermore, seems to abide by the view that causal concepts are not used in scientific context: 'scientists hardly ever make use of the notion' (1955: 486). Collingwood's discussion, however, focuses on causation in history, and is, thus, relevant for causal explanation in the sciences. Nevertheless, while Collingwood's three senses of causation are traced to the 'historical sense', involving an agent acting such as to achieve a certain goal or motivation (Collingwood, 1998 orig. 1940: 292, 323), experimentation is not discussed. Furthermore, under a plausible interpretation (Martin, 1998), sense III, which applies to natural science, is separated from the agent's perspective, and can be explained through laws. This way of making sense of unmanipulable causes seems to leave out the advantage of manipulability accounting for the role of experimentation in causal generalizations emphasized by von Wright.

There is, however, an important similarity between von Wright's and Collingwood relevant for the discussion in section 2: the focus on methodology. Both views concentrate on causal explanation rather than on causation as an ontological issue.¹ The primacy of the epistemic, or methodological aspect is also a feature shared with contemporary approaches to causation such as the one by Woodward.² The crucial difference to emphasize is that while Collingwood discusses philosophical methodology, and his approach to causation is part of his project of investigating metaphysics through identifying absolute presuppositions, von Wright provides an account of causation based on experimental methodology. This explains the stronger focus on the scientific uses of causality on von Wright's view.

Before comparing von Wright's view to contemporary approaches, I consider its reception among other manipulability-based views. Woodward (2016, section 2) presents von Wright's (1971) account as an early version of the agency theory (as in Menzies and Price, 1993). According to Woodward, the biggest issue for both von Wright and subsequent agency views is explaining nonmanipulable causes. On Woodward's interpretation, von Wright's solution relies on a concept of

¹ See D'Oro, 2002 for this interpretation of Collingwood.

² See Popa, 2016 for a discussion of Collingwood's remarks on methodology alongside contemporary approaches to causation.

similarity between manipulable and nonmanipulable causes, which is difficult to spell out in non-causal terms. For instance, the connection between magmatic activity and a volcanic eruption can be explained in terms of a lower scale model of volcanic eruptions on which intervention is possible. Woodward's objection, against both von Wright and the agency theory, would be that mapping the similarities between the model and the causal influence from the magmatic activity to the eruption of the volcano would involve other causal relations. It is this particular interpretation of von Wright that I challenge. My argument aims at establishing that von Wright's theory is in fact closer to interventionism than to the agency theory, and more compatible with scientific practice than is reflected in Woodward's (2003, 2016) discussion of early manipulability views. Illari and Russo (2014: 180-181) also discuss von Wright in the context of action-based theories of causation, and thus in the same category as the agency theory, but at the same time acknowledge the connection to experimentation and scientific practice.³

2. Von Wright on causation and experimentation

From the onset, Von Wright's discussion of causation concentrates on the scientific context. In the beginning of the chapter on causation from *Explanation and Understanding*, he states that 'the notion of cause which I will be discussing (...) is essentially tied to the idea of action and therefore, as a scientific notion, to the idea of experiment (1971: 36). This stance is presented as an alternative to the covering law model of scientific explanation (Hempel, 1965), which deliberately avoids a notion of causation going beyond the Humean regularity view, due to a set of worries about metaphysical concepts. Von Wright's point is that causal thinking is necessary for science, in order to provide a satisfactory account of causal explanation. He further holds that there is an important relation between causation and experimentation.

Von Wright's subsequent considerations on causal analysis bear an important similarity to the methodology of controlled experiments. He states that causal analysis within a system is 'closed to causal influences from outside the system' (1971: 54). Further specifications on how to manipulate causal relata include the notion of a final state of a system brought about through modifications of the anterior states (pp. 60-63). The considerations on interference deserve special emphasis: for establishing whether a putative causal relation holds between two states in a system von Wright proposes a test through free action from outside of the system. The description of the act of interference shares the arrow-breaking feature currently advocated by interventionist views:

Now assume that we change α to a and watch what happens. Assume we find that the system goes through one of its hypothetically admitted moves from initial state to end-state. The manipulation described makes possible a very powerful logical conclusion. It is that neither α nor any state which

³ The connection between Woodward's theory and the action/agency based theories is also acknowledged when discussing difference-making.

occurred anterior to α can be a sufficient condition of the initial state of the system as instantiated. A sufficient condition from the past can work only through an uninterrupted chain of successive sufficient conditions within the system, the initial state of which is that condition occurring in the past. But any such chain, if there is one, is interrupted at α . Because α , we assumed, will not change to a unless we change it (von Wright, 1971: 61).

Thus, von Wright's definition of causation through action plays out in an experimental, system-based setting, which includes the possibility of an exogenous component: 'in the idea of putting systems in motion the notions of action and of causation meet' (p. 64).

I argue that this view is very much analogous to contemporary preoccupations with causality in scientific context, namely, with experimental methodology. Since my interest lies mainly in philosophical aspects, I rely on Woodward's view, although it should be noted that this methodology was incorporated earlier, in causal modelling approaches, such as Pearl (2000) and Spirtes et al. (1993). While there are different concepts of causation at work within Woodward's approach, all of them involve interventions on a system of variables. For instance, the definition of direct cause goes as follows: 'a necessary and sufficient condition for X to be a direct cause of Y with respect to some variable set V is that there be a possible intervention on X that will change Y (or the probability distribution of Y) when all other variables in V besides X and Y are held fixed at some value by other independent interventions' (2003: 55). Woodward's definition of intervention, inspired by the formal apparatus of Pearl, and Spirtes et al. includes the following conditions:

- (M1) I must be the only cause of X ; i.e. (...) the intervention must completely disrupt the causal relationship between X and its previous causes so that the value of X is set entirely by I ,
- (M2) I must not directly cause Y via a route that does not go through X (...),
- (M3) I should not itself be caused by any cause that affects Y via a route that does not go through X , and
- (M4) I leaves the values taken by any causes of Y except those that are on the directed path from I to X to Y (should this exist) unchanged (Woodward, 2016: section 5).

This way of defining intervention is closely tied to the methodology of controlled experiments. For instance, when testing a drug, the effects of interventions are compared to the state of a control group, where the same system operates, but without the state brought about by the administration of the drug. All the other variables in the two groups are left at the same values. Woodward's discussion of the arrow-breaking feature of interventions appears to echo von Wright's considerations above: 'the idea of an intervention as an exogenous change that disrupts the mechanism that was previously responsible for the cause event' functions as 'to provide C with the kind of "independent causal history" that allows us to distinguish the effects (if any) of C on E from the effects of other "confounding" variables on E ' (Woodward, 2016: section 9). Thus, both Woodward's talk of variables and interventions and von Wright's discussion of alternating changes and observations of the subsequent states of the system can account for causality operating in the example of the drug test.

One issue here is that Woodward's concept of intervention employs causal relations, thus rendering and the interventionist approach to causation non-reductive. It is not entirely clear that von Wright can provide a fully reductive account of causation either. While he does not define manipulation in causal terms, one may consider the changes in the various states of a system to be of causal nature. Since reduction is beyond the scope of this paper, I do not pursue this issue here. It will, however, be relevant for my final remarks on the metaphilosophical aspects around the causation debate during von Wright's time and now.

As a result of comparing the two views, there are two points to make:

1. On both von Wright's and Woodward's views the interventionist/manipulationist concept of causation is defined within a system comprised of causal relata, where causal relations are singled out through interference with certain states/variables and observation of the other states/variables in the system.
2. The main use for this setting is experimental – causality is defined through manipulation in a system that meets the requirements of an ideal controlled experiment which should single out causal connections. In this sense, both concepts of causation are closely related to causal explanation.

A further important point to make is that while (1) may be read as a theoretical/formal point on how to connect causation and action, (2) has methodological implications (i.e., it provides a way of inferring causally). In my view, it is this latter point that brings von Wright's view closer to the interventionist concept of causation than to the agency one. While Menzies and Price (1993) emphasize the role of the agent's free action, in a similar fashion to von Wright, there is no specific account of how to infer causally in experimental setting. That, of course, is not to say that the Menzies-Price concept of causation is not applicable to experiments, but rather, that, unlike the one by von Wright, it was not designed through this particular framework. Thus, both von Wright's view and interventionism share the 'experimentalist' aims when it comes to defining causation. A final point worth stressing is that this analysis brings further evidence against the association between von Wright's view and the agency theory on the basis a priority of agency over causality: von Wright rejects an ontic connection between action and causation, and the conceptual connection he supports holds from the framework of a model of the kind described above, whose aim does not go beyond 'approximating' the world (1975: pp. 48-54).

3. Von Wright on counterfactuals and unmanipulable causes

The previous section focused on the similarities between von Wright's and Woodward's views involving the connection between causation and science. This section discusses the common counterfactual apparatus, with emphasis on its use for cases where human intervention is impossible. As mentioned, Woodward interprets von Wright's view as an earlier version of the agency account, using a version of the principle of analogical reasoning to deal with unmanipulable

causes. Against this interpretation, I suggest that von Wright's theory, which shares the counterfactual setting with contemporary interventionist views, relies on counterfactuals to explain unmanipulable causes. The counterfactual approach is sketched in *Explanation and Understanding* and further developed in *Causality and Determinism*.

Following up with the definition of causation cited above, von Wright holds that: 'when we cannot interfere with p and q we can nevertheless assume that there is a causal bond between them. This would be tantamount to assuming, e.g., that if we could produce p as a result of action, we could also bring about q, viz. by producing p' (1971: 72-73). Here, the case of variables unmanipulable by humans is specified. Such cases are not explained through analogy or similarity, but through a counterfactual scenario – if one could act in such way as to produce the cause, the effect would also come about. Coming back to the earlier example, the causal influence of magmatic activity on the eruption of a volcano is explained through a counterfactual involving a potential action: if the magmatic system could be controlled, then there would be corresponding changes in the volcanic eruption.

In *Causality and Determinism* this idea is further developed, and von Wright's view appears to be a full-fledged counterfactual account, where causal dependence 'is not directly one between cause and action, but between the notion of a (causal) counterfactual conditional and action' (1975: 50). According to this passage, causes are not directly dependent on the possibility of action, but on the potential of them being brought about through action. An alternative interpretation of this passage, which I do not pursue here, could go as far as holding that, under this formulation, causal dependence comes down to counterfactuals, rather than action.⁴ Furthermore, while the view expressed in *Explanation and Understanding* may be subject to debate, the further use of counterfactuals to explain unmanipulable causes is clearly stated in *Causality and Determinism*: 'this statement can be made about states of production of which is not within our ability – and the statement is true or false quite independently of whether we or anybody else ever acquire the ability' (1975: 51).

Woodward's concept of intervention is also counterfactual. Woodward emphasizes this as an advantage of his view over both earlier manipulability-based approaches and other theories of causal explanation. While grounding the reliability of the counterfactual approach to causal explanation in specific mathematical models for counterfactuals, he explains the avoidance of counterfactuals by previous philosophers of science through the dismissal of this formal apparatus: 'many philosophers of science have in turn dismissed treatments of causation and explanation that rely on counterfactuals as unclear or unscientific, despite the existence of a mathematically sophisticated literature outside of philosophy that takes just this form' (2003: 4). On the basis of the discussion above, I hold that this pattern does not include von Wright's view. As already pointed out, despite the worries about causation and counterfactuals expressed by the adepts of the covering

⁴ In the manner of Lewis, 1973.

law model, von Wright attributed causation an important role in connection to scientific explanation, and formulated a theory of causation through action modelled on counterfactuals. Furthermore, while Woodward raises the objection that early action-based theories of causation are ‘linked much too closely to the practical possibility of human manipulation’ (Woodward, 2016: section 1), I have argued that von Wright’s theory can answer this challenge in a matter similar to Woodward, since his concept of causation, despite its connection to human action, uses counterfactuals to explain potential interventions, and not only actual ones: when human intervention is impossible, causal claims can be spelled out in terms of possible interventions. Subsequently, on Woodward’s view, hypothetical interventions are expressed through counterfactuals.

An issue to raise here is that, although one may acknowledge von Wright's earlier use of counterfactuals, and their regimentation in solving the problem of unmanipulable causes, there are no considerations on truth values for counterfactuals in von Wright's work. By comparison to Woodward's account, I propose two answers to this worry. One is a *tu quoque* counterargument: although Woodward brings counterfactuals, interventions, and causal models together, it is not entirely clear what his semantics for counterfactuals is. While Woodward's interpretation of counterfactuals matches the formal considerations on causal inference from Pearl (2000), there is the issue of vicious circularity: intervention is defined in terms of counterfactuals which, in their turn, are understood through causal models. It is, thus, difficult to establish which should be explained in terms of which (see Rips for this objection).⁵ Thus, while von Wright's view may be in need of a model for counterfactuals, Woodward's approach to counterfactuals may not tell as much about the relation between causation and counterfactuals as may be expected of a counterfactual theory of causal explanation. The other answer, relating to formal issues regarding the choice of semantics for counterfactuals (see Reiss, 2012), may turn the lack of a particular model for counterfactuals into an advantage for von Wright's view. As Reiss (2012) shows in the context of social sciences,⁶ evidence for causal claims does not always admit interventions in Woodward's sense (i.e., where a variable is intervened upon independently of its cause) and sometimes one needs to backtrack.⁷ If the only acceptable model rules out backtracking, then interventionism cannot account for evidence acquired in this manner. However, if no particular understanding of counterfactuals is written into the definition of causation, then the ‘experimentalist idea of causation’ can admit of several models for counterfactuals working in causal contexts, and, thus,

⁵ It appears to be the case that causal relations are more fundamental than counterfactuals (which is the case for Pearl's models). This would make it difficult to defend a claim that causal connections presuppose a kind of counterfactual dependence.

⁶ The example from the social sciences may not be ideal, since von Wright does not aim to account for causal explanation in this area. The point of having several models for counterfactuals at work may be extended, however, for instance, to psychology (see Gerstenberg et al.).

⁷ One of the goals discussed by Reiss involves using backtracking when one aims ‘to keep as much as possible about historical actors’ situations and dispositions intact’ (p. 162).

incorporate several kinds of evidence for causal explanations. While connecting this to the issue of evidence would require more work on von Wright's proposed theory, my point here is that, in its current form, his approach leaves the option of using several types of evidence open.

Concerning the place of von Wright's view among the interventionist and agency theories, once again, von Wright's view proves to be closer to interventionism than to the agency theory. As argued, there is evidence for interpreting von Wright's view as employing counterfactuals to account for causal dependencies, in a manner similar to Woodward. Subsequently, on his view, causation is not entirely dependent on the possibility of human action, and, furthermore, with a written-in counterfactual account for unmanipulable causes, there is no need to solve the issue of defining similarity or analogy in non-causal terms.

4. Manipulability old and new

Given the similarities between von Wright's theory and current manipulability approaches, along with the recent success of the latter, a final issue to settle is why von Wright's approach to causation has not gained a more significant impact in the philosophy of science thus far. If my earlier considerations are right, the issue does not concern unmanipulable causes, since the counterfactual solution (if indeed it is taken to be better than the analogy one, as Woodward holds) was already available for von Wright. Relying on metaphilosophical considerations on what a theory of causal explanation was expected to achieve, I suggest two potential explanations, relating to the problem of reduction and the scope of the manipulationist concept of causation.

With regard to reduction, as pointed out above, the issue is whether one can completely avoid the employment of causal terms while making use of closed systems, where changes in final states are brought about through manipulating earlier states. At the time when von Wright was articulating his theory, providing a reductive account of causation held considerably more importance than at present. For this, an analogy with Weatherston's (2014: section 5.2) discussion of Lewis' theory is illustrative – Lewis's counterfactual account of causation faced objections from different sides, the adepts of reductive approaches in the 1970s, and the defenders of non-reductive approaches in the 2000s. Thus, if there is a worry about failing to provide a fully reductive account of causation as manipulability, this charge would have been more severe during the time of *Explanation and Understanding* and *Causality and Determinism* than when *Making Things Happen* was written.

With respect to the scope of the manipulationist concept of causation, von Wright openly states the limitations of his view in the context of different sciences: 'the idea of experimentalist or manipulative causation has important applications in the natural sciences—and also (...) its applicability becomes debatable when we move to the human (including the social) sciences' (von Wright, 1975: 58). Once again, given the focus on a reductive, one-size-fits-all concept of causation characteristic of the time, the narrow scope of von Wright's view was more likely to count as a

flaw, with broader projects achieving more acceptance. In contemporary context, this view appears to have shifted, with wider acceptance of domain-specific causal concepts. Despite the different motivation behind von Wright's original views, on the one hand, and causal pluralism, on the other hand, this opens new ways of connecting von Wright's view to a plurality of causal concepts. For instance, Illari and Russo (2014: 181) suggest that von Wright's view can be integrated within causal pluralism. Admitting that the manipulationist concept of causation may be better suited for certain areas while its effectiveness may be limited in others can be coalesced with the claim that different concepts of causation could work for different sciences. The latter idea, as one of the main statements of causal pluralism (Hall, 2004; Godfrey-Smith, 2010), gained plausibility later on, possibly owing to the failed attempts to defend a concept of causation encompassing uses across different scientific fields. This connection can be further supported by von Wright's claim that 'we may (...) distinguish types of causation and say that causation in the natural sciences is primarily of the manipulative type, whereas in the human sciences another type (or other types) of causation and of causal explanation are prominent' (1975: 58). Another point to make in relation to the comparison with Woodward's view is that while von Wright admitted the limited applicability of his concept of causation, Woodward aims at extending the area of applicability for interventionism as far as possible. While this opens the floor for further objections, such as the above mentioned criticism by Reiss's (2012) about the use of the interventionist interpretation of counterfactuals for causal explanations in the social sciences, a tension should be noted. Although recently causal pluralism appears as an acceptable position to take, specific accounts of causation (in particular manipulability and mechanistic views)⁸ aim to account for as many uses of causal claims as possible (and thus, to go beyond pluralism). Since von Wright's view does not share these aims, it would be a better fit for a pluralist setting.

To sum up, if theories of causation were expected to provide reductive accounts and cover all the uses of causal claims, von Wright's view may have had two serious shortcomings at the time it was put together. This may have prevented his view from gaining wider application to the domain of scientific explanation, and, consequently, led to the two important features discussed in this paper - the connection between causation and experimentation, along with the use of counterfactuals - going unexplored. I take this to further emphasize the need to reassess von Wright's view on causation given the points it shares with the present debates in the field, and the changes in assumptions of what theories of causal explanation should fulfill.

5. Conclusions

I argued that von Wright's account of causation shares two important features with contemporary approaches to causation. The former, methodologically-oriented one, concerns the connection

⁸ See Psillos, 2003, for instance.

between causation, action, and experimentation, linking causation and action within the workings of a system. The latter regards von Wright's employment of the counterfactual interpretation of closed systems and exogenous interventions to answer one of the main difficulties of manipulability theories - explaining unmanipulable causes. Both of these features are found in a more elaborated and technical version in Woodward's approach, while von Wright's work is commonly considered as a precursor of the contemporary agency theories, through the connection between causation and action. My arguments show that there is more than relating causation to action that makes von Wright's view relevant for recent debates on causation, and that in von Wright's work this connection is spelled out in ways common to the contemporary literature on causation and causal inference (reliant on the system approach and counterfactuals).

These findings are firstly important from a history of philosophy perspective, as von Wright's insights into the methodology of controlled experiments, counterfactuals, and his proposed solution to the problem of unmanipulable causes are not fully reflected in the present discussion around the history of manipulability-based approaches to causation. I hold that, through these features, von Wright's view proves to be closer to Woodward's manipulability approach than to the agency theory. Secondly, there are aspects of von Wright's theory that can shed light on contemporary debates around manipulability. Buzzoni's (2015) defence of an action-based approach to causation against the charge of anthropomorphism on the basis of von Wright's original account is illustrative in this sense. I take these uses of von Wright's theory to be enabled, at least in part, by the features pointed out above, common with contemporary approaches to causation.

Von Wright's view on causation, proves, thus, to be an important connection point between theories of causation grounded in action and causal generalizations in the sciences. While its potential employment in solving current problems related to causation would require further adjustment and elaboration, I have pointed out that von Wright's view is in line with the main goals of contemporary theories.

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References

- Buzzoni, M. (2015), 'The Agency Theory of Causality, Anthropomorphism, and Simultaneity' *International Studies in the Philosophy of Science* 28 (4): 375-395.
- Collingwood, R.G. (1938), 'On the So-called Idea of Causation', *Proceedings of the Aristotelian Society* New Series, Vol. 38, pp. 85-112.
- Collingwood, R.G. (1998), *An Essay on Metaphysics*, Oxford: Clarendon Press.
- D'Oro, G. (2002), *Collingwood and the Metaphysics of Experience*, Routledge.
- Gasking, D. (1955), 'Causation and recipes', *Mind* 64 (256): 479-487.
- Gerstenberg, T., Bechlivanidis, C. & Lagnado, D. A. (2013), 'Back on track: Backtracking in counterfactual reasoning' in M. Knauff, M. Pauen, N. Sebanz, & I. Wachsmuth (Eds.), *Proceedings of the 35th Annual Conference of the Cognitive Science Society*. Austin, TX: Cognitive Science Society.
- Godfrey-Smith, P. (2010), 'Causal pluralism', in H. Beebe, C. Hitchcock, and P. Menzies (eds.), *Oxford Handbook of Causation*, pp. 326–37, Oxford University Press, Oxford.
- Hall, N. (2004), 'Two Concepts of Causation', in Collins et al., *Causation and Counterfactuals*, The MIT Press.
- Hempel, C.G. (1965), *Aspects of Scientific Explanation*, New York, NY: Free Press.
- Illari, P. & Russo, F. (2014), *Causality: Philosophical theory meets scientific practice*, OUP.
- Lewis, D. (1973), 'Causation', *Journal of Philosophy* 70: 556–567.
- Martin, R. (1998), 'Editor's Introduction', in R.G. Collingwood, *An Essay on Metaphysics*, Oxford: Clarendon Press, pp. xv-ci.
- Menzies, P. & Price, H. (1993), 'Causation as a Secondary Quality', *British Journal for the Philosophy of Science*, 44, pp. 187–203.
- Pearl, J. (2000), *Causality*. New York: Cambridge University Press.
- Popa, E. (2016), 'Collingwood and Manipulability-based Approaches to Causation: Methodological Issues', *Collingwood and British Idealism Studies*, Volume 22, Number 1, 2016, pp. 139-166.
- Psillos, S. (2003), A glimpse of the secret connexion: harmonising mechanisms with counterfactuals. *Perspectives on Science*, 12(3), 288–319.
- Reiss, J. (2012), 'Counterfactuals', *Oxford Handbook of the Philosophy of Social Science* (ed. by Harold Kincaid), Oxford: OUP, 154-83.
- Rips, L. (2010), 'Two Causal Theories of Counterfactual Conditionals', *Cognitive Science* 44: 2, 175-221.
- Spirtes, P., Glymour, C., & Scheines, R. (1993), *Causation Prediction and Search*, New York, NY: Springer-Verlag.
- Von Wright, G.H. (1971), *Explanation and Understanding*, Routledge & Kegan Paul, London.
- Von Wright, G.H. (1975), *Causality and Determinism*, Columbia University Press.

Weatherson, B. (2014), 'David Lewis', *The Stanford Encyclopedia of Philosophy* (Winter 2014 Edition), Edward N. Zalta (ed.), URL = <<http://plato.stanford.edu/archives/win2014/entries/david-lewis/>>.

Woodward, J. (2003), *Making Things Happen*, Oxford University Press.

Woodward, J. (2016), 'Causation and Manipulability', *The Stanford Encyclopedia of Philosophy* (Winter 2016 Edition), Edward N. Zalta (ed.), plato.stanford.edu/entries/causation-mani/.