Worldly Indeterminacy

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Abstract

How many deaths were prevented by the COVID-19 measures in Switzerland? If all gasoline-powered cars were banned worldwide from 2025, what would be the impact on the global temperature? These questions refer to scenarios that are, at least to some extent, indeterminate. It is rather uncontroversial that the number of COVID-19 related deaths in Switzerland would have been higher if there had been no COVID-19 measures. However, the exact number of deaths that would have occurred cannot be determined. And while it is undisputed that CO_2 emissions from cars have an impact on global warming, the exact temperature difference that would result from a total ban on gasoline-powered cars cannot be determined. A standard response here is that these inaccuracies are merely epistemic, and that if one could take the viewpoint of a cognitively unlimited being, one would be able to fully determine the effects of COVID-19 measures and CO_2 emissions.

However, there is an emerging debate in contemporary metaphysics that there may be worldly indeterminacy. The world itself may be indeterminate, regardless of how much we know. While the general idea of worldly indeterminacy has been discussed for some time, there are two types of worldly indeterminacy that are just beginning to be explored. First, there is indeterminacy about causation and prevention: there may be cases where it is indeterminate whether one event caused or prevented another event. Second, there is indeterminacy about the laws of nature: it may be indeterminate what the laws of nature are and whether certain states of affairs or scenarios are nomologically possible. These two kinds of indeterminacy are closely related to the notion of future indeterminacy, the widespread intuition that the future state of the world is indetermined at the present moment.

This project seeks to open up new directions in the debate on worldly indeterminacy. First, it gives reasons why causal, nomic, and future indeterminacy should indeed be regarded as kinds of worldly indeterminacy, and develops theories of causation and lawhood that take this observation into account. Second, it builds an intradisciplinary bridge between these metaphysical theories and theories of normative judgement. How can actions or measures be evaluated normatively when it is indeterminate what exactly they have caused or prevented? More generally, what is the relationship between normative facts and non-normative facts if non-normative facts can be indeterminate? By addressing these questions, the project will shed new light on the ethical evaluation of hypothetical scenarios that are relevant to areas of societal concern, such as scenarios in health ethics or climate ethics.

More detailed project description

1. Introduction

During the COVID-19 pandemic, one of the central topics of debate was the so-called *prevention paradox*. Measures were taken to prevent the spread of the virus and to mitigate its impact on vulnerable groups. Since these measures were effective in many countries, the spread of the virus was less harmful than it could have been (albeit harmful enough). But this led critics to conclude that the measures had not been necessary in the first place.[1]

Obviously, this kind of argument was part of the pseudo-scientific discourse that tried to discredit COVID-19 measures. From a philosophical-argumentative perspective, the inference that the COVID-19 measures were unnecessary because some of the worst consequences of the pandemic did not occur is not valid. But how exactly can one respond to arguments of this kind? A key issue is that it seems indeterminate, at least to some extent, what would have happened if the COVID-19 measures had not been implemented. It is fairly uncontroversial that the death toll would probably have been considerably higher, but exactly how much and what the other societal consequences would have been will not be precisely determinable *post hoc*. But then it is also partly indeterminate to what extent the COVID-19 measures prevented more harmful outcomes.

The fact that it is indeterminate what exactly would have happened if there had been no COVID-19 countermeasures should not lead to the conclusion that the countermeasures were unnecessary, and this is clearly not the conclusion drawn by experts who analyze empirical data on the COVID-19 measures (The Royal Society 2023). However, arguments of this or similar form are often found in public discourse, not only with respect to COVID-19 measures, but also with respect to other global and societal challenges.

One might wonder, for instance, what the impact on the global temperature would be if all gasoline-powered cars were banned worldwide starting in 2025. There is no question that CO_2 emissions from cars have an impact on global warming. However, the exact temperature difference that would result from a total ban on gasoline-powered cars cannot be determined. But again, this indeterminacy should not be taken as a reason not to make efforts to reduce the number of gasoline-powered cars. Similarly, with respect to military crises and conflicts, such as the war in Ukraine, there seems to be indeterminacy with respect to what could have been done in the past to prevent these catastrophic developments and what can be done in the future to prevent further crises.

A standard view on such scenarios is that the indeterminacy is entirely due to epistemic limitations. If one could take the viewpoint of a cognitively unlimited being, one would be able to fully determine the effects of past actions – what they caused and what they prevented – and one would also be able to predict the effects of possible future actions. In contrast to this, the

[1] The term 'prevention paradox' is ambiguous. It was originally used by the epidemiologist Geoffrey Rose to describe situations in which it is more effective at the population level to impose preventive measures on a subpopulation of people at low risk of developing a particular disease than on a subpopulation of people at high risk of developing that disease, for the purely statistical reason that there are many more low-risk individuals than high-risk individuals in the population (Rose 1985). However, during the COVID-19 pandemic, the term was also commonly used to describe the phenomenon explicated above (Franzkowiak 2022). Note that when used in the latter sense, the term does not describe a paradox in the strict philosophical sense of the word, but rather a cognitive bias.

working hypothesis of this project is that the world itself is indeterminate in some respects. While epistemic limitations will always play a role in considering hypothetical or future scenarios, there is a residual worldly or ontological indeterminacy about the way the world unfolds over time that does not disappear no matter how much one knows. In particular, this implies that it is sometimes truly indeterminate whether an action or measure caused or prevented a particular outcome, or whether an agent had the ability to bring about or prevent a particular outcome.

This has far-reaching consequences for evaluative judgments. One crucial question is how we can ascribe responsibility to agents if it is indeterminate whether their action caused or prevented something. Another question is to what extent the consequences of an action should be relevant to its moral evaluation if the consequences can be indeterminate. More generally, the question arises of what the relationship between normative facts and non-normative facts actually is if non-normative facts can be indeterminate. Answering these questions is directly relevant to evaluative judgements about hypothetical scenarios such as those described above.

This project thus spans several areas of philosophy. In particular, it links foundational research in metaphysics and the philosophy of science on the question of whether and where there is indeterminacy in the world with the ethical and metaethical question of how to make evaluative judgements under the assumption of worldly indeterminacy, which also has implications for areas of societal concern, such as health ethics or climate ethics.

2. State of the art

Traditionally, indeterminacy phenomena are studied with respect to natural language. It is a commonplace that expressions of natural language are often vague, and as a result the truth values of statements containing them may be indeterminate. Predicates such as 'heavy', 'small' or 'bald' are paradigmatic examples. It seems clear that a suitcase that weighs 3kg is not heavy, whereas a suitcase that weighs 30kg is heavy. However, it is indeterminate whether a suitcase weighing 23kg falls under the predicate 'heavy'. One of the defining characteristics of vague expressions is that they lead to Sorites paradoxes: a suitcase that weighs 3kg is not heavy, a suitcase that weighs 3.001kg is not heavy either, and if we keep increasing the weight of the suitcase little by little, none of these little increases seems to make the crucial difference between 'not heavy' and 'heavy'. But this would mean that a 30kg suitcase – a weight that is eventually reached by these small steps – does not count as heavy, which contradicts the intuition that a 30kg suitcase clearly is heavy. In the philosophy of language, the question of how to resolve Sorites paradoxes has been the subject of intense debate (see, e.g., Keefe 2000; Williamson 1994).

Another source of indeterminacy is epistemic constraints. As cognitively limited beings, humans cannot evaluate all possible scenarios, cannot reliably say how the world would turn out if certain initial conditions were different, and cannot predict what will happen in the future. Therefore, it seems to us that there is indeterminacy about hypothetical scenarios and about how the world evolves over time.

The working hypothesis of this project is, however, that there is also worldly indeterminacy.[2] According to Barnes, worldly indeterminacy can be defined as the indeterminacy that would remain if all representational content, such as the meaning of linguistic expressions, were precisified and if one could take the standpoint of an omniscient, cognitively unlimited being (Barnes 2010b). The thesis that there is worldly indeterminacy in this sense has recently received increasing attention (Akiba 2004; Barnes 2010b; Barnes and Williams 2011; Smith and Rosen 2004; Wilson 2013, 2016; Williams 2008a). It is also controversial: some prominent authors simply deny that worldly indeterminacy exists (e.g., Dummett 1975; Lewis 1993). Others argue that worldly indeterminacy should be treated with caution, because indeterminate identity leads to inconsistencies (the *locus classicus* of this view is Evans 1978; but see Priest 2021; Williams 2008b, for discussion) or because indeterminate existence has inconsistent implications (the main proponent of this view is Sider, see Sider 2003; but see Barnes 2010a, for discussion).

Even if one is generally sympathetic to the idea of worldly indeterminacy, there is room for debate about what the exact loci of indeterminacy are. One might hold for instance that there is indeterminacy at the level of quantum phenomena (Calosi and Mariani 2021; Calosi and Wilson 2019; Darby and Pickup 2021; Skow 2010). However, this view this does not necessarily imply that there is also indeterminacy in the macroscopic world, and one might deny this. Another option is to hold that many macroscopic objects, such as mountains, organisms, or houses, have indeterminate boundaries (see, e.g., Torza 2023 for a discussion of this thesis), but to deny that there are also indeterminate relations.

The kind of worldly indeterminacy addressed in this project is different from quantum indeterminacy and different from the thesis that there are vague objects. It is also independent of the thesis that certain predicates or properties lead to Sorites paradoxes. The working hypothesis of this project is that there are three interrelated kinds of worldly indeterminacy, all of which are relevant to how the world evolves over time: causal indeterminacy, that it is sometimes indeterminate whether one event caused or prevented some other event; nomic indeterminacy, that it is indeterminate what the laws of nature are and what is nomologically possible; and future indeterminacy, that it is indeterminate at the present time what the world will be like at future times.

To see how causal indeterminacy arises, consider again the question of what exactly would have happened in the absence of COVID-19 policies. Suppose that the question is to what extent the rules requiring that masks be worn in public prevented COVID-19 deaths. The answer to this question depends crucially on the contrast scenario, that is, on whether we assume that without the rule, nobody would have worn a mask, 10% of the people would have worn a mask, or 25% of the people would have worn a mask, and in what situations people would have worn masks – on public transport, in the supermarket, etc. The possible alternative scenarios are so diverse that it is impossible to determine what *the* alternative scenario is that should be considered in determining whether and to what extent the wearing of masks prevented COVID-19 deaths.

[2] I use the term 'worldly indeterminacy' throughout to describe the phenomenon which is often also called 'ontic indeterminacy' or 'metaphysical indeterminacy'.

It is well known that counterfactual conditionals, that is, statements about what would have happened if something else had not happened or had not been the case, are sometimes indeterminate (Lewis 1973b, 66-67; Quine 1960, §46). What has been largely ignored, however, is that indeterminacy about hypothetical situations can lead to causal indeterminacy. It is plausible to understand prevention as a kind of causation: an event c prevented an outcome o iff c caused o not to occur, but if c had not occurred, then o would have occurred. However, if it is indeterminate whether o would have occurred without c, as may well be the case, then it is also indeterminate whether c prevented o (Hoffmann-Kolss 2024; for other arguments for causal indeterminacy, see Bernstein 2016; Swanson 2017). For instance, it is indeterminate whether the requirement to wear masks in public places prevented exactly 1,333 COVID-19 deaths in the canton of Bern, since it is indeterminate what exactly would have happened if the rule had not existed. In general, if causal relations are analyzed in terms of counterfactual dependence relations, as some of the most prominent approaches to causation suggest (Hitchcock 2001, 2007; Lewis 1973a; Woodward 2003), and if counterfactuals can be indeterminate, then causal relations can also be indeterminate.

This type of causal indeterminacy does not primarily occur at the microphysical level, but is relevant to the macroscopic world. (However, it can also be argued that indeterminacy at the quantum level leads to causal indeterminacy, see Lam, Letertre and Mariani 2022.) Moreover, it has strong connections with future indeterminacy and nomic indeterminacy, that is, with the other two kinds of indeterminacy that play a crucial role when there is indeterminacy about the way the world unfolds in time.

Future indeterminacy, the notion that the future is open, has been the subject of philosophical debate since antiquity. In his *De Interpretatione*, Aristotle introduced the problem of future contingents, using the famous sea battle example (Barnes 1984). If it is assumed that the future is open with respect to whether there will be a sea battle tomorrow, then the truth value of the proposition expressed with 'There will be a sea battle tomorrow' seems indeterminate. One reason the future may be indeterminate is that the laws of nature are indeterministic, that is, they give us only probabilities of what will happen. Then the present state of the world in conjunction with the laws of nature is not sufficient to determine future states of the world. Whether there are probabilistic laws will probably have to be settled empirically (Hüttemann 2022). However, as Barnes and Cameron argue, the thesis that the future is open can be defended independently of the thesis that the laws of nature are indeterministic (Barnes and Cameron 2009).

If future indeterminacy is indeed a kind of worldly indeterminacy, that is, if the future does not only appear to us to be open, but is genuinely open, then future indeterminacy supports the hypothesis that indeterminacy about prevention is a kind of worldly indeterminacy. According to the notion of prevention mentioned above, it is indeterminate whether c prevented o if it is indeterminate whether o would have occurred in the absence of c (and all other conditions of prevention are satisfied). One reason it is indeterminate whether o would have occurred without c has been pointed out above: that the alternative scenario that would have occurred if c had not occurred is indeterminate. But even if the alternative scenario is exactly determined, future indeterminacy implies that it is open whether it would have led to o, since according to future

indeterminacy, earlier states of the world do not determine later states of the world. Therefore, future indeterminacy is a second reason for postulating indeterminacy about prevention.

In contrast to future indeterminacy, nomic indeterminacy, the other kind of indeterminacy to which causal indeterminacy is related, has only recently received attention. The way the world unfolds in time follows the laws of nature. It is usually taken for granted that the laws of nature themselves are not vague, and that nomic possibility is not a vague notion either: the set of worlds in which the same laws of nature hold as in the actual world has a clear boundary, and it is determined for each world whether it is a member of this set. However, these assumptions can be challenged. Chen has recently argued that there may be nomic indeterminacy in the sense that the set of nomologically possible worlds has fuzzy boundaries (Chen 2022; noteworthy recent precursors are Fenton-Glynn 2019; Hájek 2003). Note that nomic indeterminacy in this context does not mean that the laws of nature are indeterministic or probabilistic, but that it is indeterminate what the laws of nature (be they deterministic or probabilistic) are (for a detailed discussion of what it is for there to be nomic indeterminacy, see Werner manuscript).

If there are convincing arguments that the laws of nature can be indeterminate, this will also have implications for our evaluation of hypothetical situations, since what the course of the world would be if certain initial conditions were different depends crucially on the laws of nature. Thus, the claim that nomic indeterminacy is a kind of worldly indeterminacy lends additional support to the thesis that causal indeterminacy is a worldly matter. In addition, understanding nomic indeterminacy as a kind of worldly indeterminacy supports the thesis that future indeterminacy is a worldly thing, since what the course of the world *will* be also depends on the laws of nature.

While metaphysical theories of the open future are an established branch of debate, the debate about causal indeterminacy and nomic indeterminacy is just beginning. The study of these two phenomena of indeterminacy will have implications not only for our general metaphysical picture of the world, that is, the question of whether it is partially unsettled what the world is like, but also for our theories of causation and the laws of nature.

In addition, causal, nomic, and future indeterminacy have far-reaching consequences for theories of normative judgement. It is commonly assumed that agents can only be held responsible for an outcome if they actually caused it (Driver 2008; Sartorio 2007) and had the ability to prevent it. However, if it is sometimes indeterminate whether an agent caused an event by their action or had the ability to prevent it, this may imply that it is sometimes indeterminate whether they can be held responsible for the event – at least if all other conditions for responsibility, such as not having been in a state of coercion, having been fully aware of what one was doing, etc., are satisfied (Bernstein 2016). Therefore, the thesis that there is causal indeterminacy raises the question of whether there is also indeterminacy in attributions of responsibility, and if not, how we should conceive of the relationship between causation and moral responsibility.

Another question arises if we assume that the consequences of an action play a crucial role in its moral evaluation. If the consequences of an action are indetermined due to future indeterminacy and if we cannot even calculate the probabilities of possible outcomes due to nomic indeterminacy (Fenton-Glynn 2019), the question arises of whether and how we can judge actions according to their consequences.

And finally, a prominent guiding principle of evaluative judgement is that evaluations of situations or actions that are relevantly similar should match each other. In metaethics, this consideration is captured by the principle of moral supervenience, according to which our use of evaluative terms should be regulated by the assumption that evaluative properties, such as *being good*, *being virtuous,* or *being appropriate*, supervene on descriptive, that is, non-evaluative properties (Blackburn 1985; Hare 1952). If two agents x and y are in exactly the same descriptive situation and also perform exactly the same actions, then the evaluation of their actions must be the same: if agent x is held morally responsible for the outcome of her action, then agent y must also be held morally responsible for the outcome of her action. Similarly, if a particular COVID-19 countermeasure, such as the rule that masks must be worn in public places, is judged to be appropriate in situation A, and if one encounters a situation B that is descriptively exactly like situation A, then imposing the rule that masks must be worn in public places in situation B must also be judged to be an appropriate countermeasure.

This plausible principle seems to reach its limits when the relevant descriptive facts can be indeterminate. What outcomes an action causes or prevents and whether the agent had the ability to bring about or prevent a certain outcome are descriptive facts that are highly relevant to the moral evaluation of the action. But what if these facts are partially indeterminate, and what if, because of this indeterminacy, it is not possible to determine whether two situations are descriptively exactly the same?

The working hypothesis that causal, nomic, and future indeterminacy are kinds of worldly indeterminacy thus poses pressing challenges for theories of normative judgement, especially with respect to judgements about hypothetical scenarios. Addressing these challenges will shed new light on evaluative judgments in indeterminate contexts.

3. Objectives

Objective 1: Indeterminate causation and prevention: The first focus of the project is on the notions of causation and prevention, which are indispensable for our theorizing about hypothetical scenarios. The aim is to investigate why and to what extent causation and prevention are indeterminate and to develop a theory of causation that is consistent with this kind of indeterminacy.

Objective 2: Nomic and future indeterminacy: The second focus of the project is on the notions of nomic and future indeterminacy. It will be investigated in detail what exactly is the relationship between causal indeterminacy, future indeterminacy, and nomic indeterminacy, what theory of lawhood is consistent with nomic indeterminacy, and what theory of time is consistent with future indeterminacy. The overarching aim is then to develop a unified account of indeterminacy about how the world unfolds over time that can capture all three kinds of indeterminacy.

Objective 3: Normative consequences: The third focus of the project is on the normative consequences of indeterminacy about how the world unfolds over time. The aim is to develop a theory of normative judgment that is compatible with scenarios in which non-normative

facts are indeterminate, and to apply this theory to questions of moral responsibility and to normative judgements about hypothetical scenarios.

4. Timeline and project group

The project will run for five years. The starting date is March 1, 2025. The project group will have four members: Vera Hoffmann-Kolss (www.hoffmann-kolss.de) as the PI, Jonas Werner (https://philpeople.org/profiles/jonas-werner) as a postdoctoral researcher, and two PhD students. The PhD positions will be advertised internationally and will run for four years.

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