

The Necessary Uniformity of Nature

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ABSTRACT | In this essay, I shall defend the uniformity of nature in a new way, and that defense, in turn, will require us first to consider some a priori/conceptual ideas about what is psychologically impossible. Those ideas depend on an insight one can find in G. E. M. (Elizabeth) Anscombe's famous book *Intention*. But I will attempt to generalize that insight and show how it allows us to justify a wide range of conclusions about what is, on conceptual grounds, impossible for the mind or xin. Then I will argue that there are parallel conceptual impossibilities in nature outside the mind or xin, and that discussion will ultimately lead to the conclusion that nature both inside and outside the mind has to be uniform.

KEYWORDS | A Priori; Psychologically Impossible; the Mind; Nature; Uniformity

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1 Psychological Impossibilities

I believe that the contents of the mind, and especially beliefs and desires, are necessarily more restricted than previous philosophical thinking East or West has ever suggested. There are things it is metaphysically impossible to believe or desire, and Elizabeth (G. E. M.) Anscombe has pointed out one very plausible and striking example of such a desire that no one could have. If we go with that example, we can easily mention others, and our discussion will then spill over into ideas about how certain sorts of beliefs (and inferences) are also metaphysically impossible. Anscombe argues that it is impossible in the strictest sense for anyone to simply want a saucer of mud, to want it for no reason beyond or ulterior to that simple desire. And I find this idea pretty compelling. Yes, you could want a saucer of mud because the saucer shaped mud in a good way in preparation for a facial, but that is not simply wanting a saucer of mud. Yes, you or a robot could be built with a mechanism and software that caused you to choose or pick saucers of mud whenever you were asked to choose decoration for your home or office, but this wouldn't amount to desiring or wanting a saucer of mud unless obtaining it made one feel pleased or delighted; and it is dubious that such an intentionally-loaded and vivid state of mind/xin could mechanically fall out of a software program or, for that matter, out of pure instinctual reflexes or automatisms. So I am persuaded by Anscombe's example.¹

However, many philosophers have at least implicitly rejected Anscombe's example. R. M. Hare's prescriptivism and many versions of emotivism seem committed to the idea that emotion and reason/cognition are separate, so that any fact or reality could be the object of any emotion. Such views treat emotion and desire as in some sense ultimately arbitrary: anything can in principle be desired or hated, and evaluative judgments simply express desire or emotional/conative attitudes toward various entities without being constrained by any other factors. But Anscombe's example and others like it tell a different story.

Here is another example inspired by some work of Philippa Foot. Could anyone have a basic desire, could anyone simply want, to (always) turn northeast after turning northwest? Again, I think this makes no sense, and in fact Foot used her original version of this example to argue against Hare's prescriptivist view that our ultimate values (or desires) can be *absolutely arbitrary*.²

However, it is not just desires and emotional attitudes that are metaphysically limited in this way. Similar points apply to beliefs, though the examples I want to

¹ Anscombe's example comes from her book (Anscombe 1957, p. 70 and passim).

² The example, which I have somewhat modified for present purposes, comes from Foot's "Moral Beliefs," reprinted in her (Foot 1978).

rely on are different from any I know of that have been mentioned in the literature surrounding belief. Let me give you one plausible instance taken from the literature relating to Nelson Goodman's New Riddle of Induction.³ Goodman defines a predicate "grue" as applying to green things examined before now and to blue things not so examined (examined only after now or never examined at all), and since all emeralds examined up till now have been both green and grue, the question Goodman raised was whether or why we have reason to believe other emeralds to be green rather than grue and therefore blue. No one who has previously discussed this issue (including my earlier self) has ever disputed the possibility that some creatures other than ourselves might find it natural to generalize with "grue." We have just wanted to know why it is reasonable at least for us to reject such generalizations.

Recently, though, I started to think more generally about the implications of what Anscombe had said about desiring a saucer of mud, and in particular I started looking at the New Riddle of Induction in the light of Anscombe's example. This made me reconsider my assumption, shared with everyone else who had discussed the matter, that people who have seen only green emeralds could inferentially believe that the next emerald to be viewed would be grue and blue, rather than green. It began to occur to me that such an inference is really not intelligible to us and that there is reason, based on the analogy with Anscombe's example, to hold that such an inference simply couldn't occur – if you will, that such an inferential belief is metaphysically impossible. After I had arrived at this conclusion, my then research assistant David DiDomenico put me in touch with a passage in which David Lewis analogized between the desire for a saucer of mud and the inferential belief that emeralds not yet examined are, or are likely to be, grue/blue.⁴ Lewis very circumspectly stopped short of pushing the analogy fully home and never quite claimed that inferring with "grue" is just as impossible as simply wanting a saucer of mud. But that is precisely what I want to do here and have done at greater length elsewhere. (See the second appendix of my book (Slote 2018), with side-by-side English language and Chinese language texts.) Thus it is not just desires and attitudes, but also beliefs and inferences, that have limits as to their metaphysical possibilities.

³ See (Goodman 1965).

⁴ See (Lewis 1996, p. 306).

2 Physical Impossibilities

Some psychological items turn out to be metaphysically impossible, even though many of us have confusedly thought in many instances that they were possible. Corresponding to this and similarly unfamiliar are physical events, facts, or things that turn out to be metaphysically impossible despite our long having thought that they were possible. I have not yet said or said very much about what kinds of physical things fall into this category, but before saying any more, I would like to anticipate a further parallel between the mental and the physical as regards metaphysical/conceptual impossibility.

As we shall see in a moment and may have been obvious to some readers all along, there are two basic ways in which contents of *xin* turn out to be metaphysically impossible. One way, as with desiring a saucer of mud, doesn't rest on any impossibility having to do with particulars or particularity; the other way does, as when the present moment is believed to make all the difference to the color of emeralds according to the *grue* hypothesis. And there is a parallel within the category of (surprising or unanticipated) physical impossibilities. In some cases (as I hope to show you) the impossibility has something to do with particulars or particularity; in other cases it doesn't. But in order to introduce this distinction within physical impossibility, I think I should first say a bit more about the two ways in which mental (i.e., psychological) items or facts can be metaphysically impossible.

I mentioned the *grue* example as illustrating a psychological impossibility (of belief or belief formation) that seems to arise from a relation to some particular (the present moment), and that seems, therefore, related to particularity. However, even Anscombe's example can be changed into something involving a particular. If no one could simply desire a saucer of mud, no one could simply desire this saucer of mud rather than some other. The impossibility derives at least in part, of course, from what general kind of thing is said to be wanted. But particularity seems to play a role too. One can't just want this delicious ice cream, want it for no reason other than the fact that it is this ice cream rather than that ice cream over there. (If it is harder to reach the ice cream over there, then the desire for this ice cream isn't just based on the fact that it is this ice cream.) And given the similarity to this ice cream case, the desire for a particular saucer of mud can be said to be impossible at least partly because of the particularity it involves. (Impossibility may be conceptually or metaphysically overdetermined in such cases.)

So some cases of impossible desire or belief depend on particularity, but, of course, Anscombe's famous original example does not. Moreover, once we recognize the impossibility of that sort of psychological item, other examples depending not on particularity but on the general kind of thing that is supposed to be

wanted or believed can easily be thought up. No one could simply want (to possess) a/some glass or container full of water: there has to be some reason why one wants it. And no one could simply believe that the perennial popularity of chocolate ice cream is or would be evidence that Pluto has no atmosphere. So here in the area of (inferential) belief we have an example of impossibility that, unlike the grue case, makes no essential reference to any particular time.

So there are two patterns to what is metaphysically impossible for or in the mind or *xin*, one having to do with particularity, the other not; and I want now to show you that analogous metaphysical impossibilities in or of the physical realm likewise break down in two (sometimes overlapping) classes or categories: those where the impossibility derives from particularity and those where other reasons make some physical fact or entity metaphysically impossible. With regard to the former, I shall be banking on an assumption that I think most philosophers or philosophers of science make or would be willing to make. I am going to presume at the outset that particularity cannot operate at the most fundamental level as causally/physically explanatory (though I think that what I have to say using this assumption will actually tend to support it).⁵ Given this assumption, philosophers by and large (myself included) have tended to be rather superficial and confused with regard to entities or things that we have believed to be metaphysically possible but merely ruled out by the contingent laws of nature of the actual universe. These entities, these facts, these fundamental explanations are arguably (and I will give the arguments) metaphysically impossible, impossible in principle, and not just impossible in relation to contingent empirically known facts about the universe.

What do I have in mind? Well, none of us or almost none of us believes in magic (I am not here speaking of magic *tricks*). But I have never heard or seen any philosopher or, for that matter, anyone else say that magic as traditionally conceived is a metaphysical impossibility. Yet if we buy into the assumption about particularity I said I would rely on, then many kinds of magic are ruled out a priori and not (merely) as a result of accumulating empirical knowledge, because many kinds of magic implicitly assume the efficacy of the particular or the particularity of some entity.

There are many legends, stories, or myths according to which a particular in-

⁵ This assumption doesn't assume that there can't be indeterministic elements in causation. It might be the case that the movement of a given electron is undetermined and that things have been set up in such a way that if it moves in one direction, it will cause the death of a cat and if it moves in another direction, the death of a dog. (Shades of Schroedinger's cat!) But this doesn't entail that there is a *basic physical/causal explanation* of why the electron came to cause the death of a cat, if that turns out to be what happens.

dividual (and what I am saying about fictional individuals can also be said about various fictional *things*) uniquely has the power to accomplish some task but nothing is *said* about how they and they alone got that power. You might argue that in such cases it is always *assumed* in the (telling of the) legend or story that there is a causally understandable source of that power that separates the individual with the special power from all the others who lack it, but I don't think that that would be accurate. In some stories no such assumption seems to be explicitly or implicitly made, and the idea is conveyed or insinuated that the given individual has their amazing power just because of who they are and without any further explanation being needed. This is an instance of fictional magic power that is at least implicitly understood as grounded in particularity, and I am saying that such particularistic explanation cannot in principle apply to or in non-fictional reality. (I am indebted here to discussion with Nancy Snow.)

Let me give you another and more specific example of where particularity is assumed to have explanatory force in regard to (non-fictional) physical events: unlucky numbers like thirteen in the West and in China the number four. It has been said that belief in the unluckiness of thirteen can be traced to the recognition, among the ancient Hebrews, that the thirteen letter of their alphabet is also the first letter of the Hebrew word for death. But even if that, fancifully, might be a reason to believe the number unlucky, I think or hope no one believes the number is unlucky *because* of its relationship with the Hebrew alphabet. I don't think the fact about the alphabet and the Hebrew language is supposed to be causally explanatory. The Last Supper offers us what may seem to be a better argument for believing in the bad luck supposedly inherent in the number thirteen. The fact that there were thirteen at the Last Supper may be thought to be the best causal explanation of *why* thing went so badly (from a limited perspective) right after the Last Supper. The idea here (as I am for our purposes conceiving it) is not that the Last Supper caused the number thirteen to be unlucky, but rather that the inherent unluckiness of that particular number might explain why things went so wrong immediately afterward.

But I wonder whether this is really intelligible. If the unluckiness of the number is not due to events in the history of the Jews, it has to be inherent in that number as that number, and that doesn't make sense. Remember too that the unluckiness of thirteen isn't just a matter of cardinality, where groups containing thirteen members are somehow jinxed because of the number of their members. Thirteen is also thought of as ordinally unlucky, as when people don't want to live on the thirteenth floor of a building and floors are numbered accordingly. (The same thing happens in Taiwan with the number four.) So the unluckiness of the number in the popular imagination is more general and in some sense more abstract than

anything to do with the cardinal number thirteen or its ordinal counterpart, and is something that abstract really capable, even in principle, of entering into physical explanations (e. g., of why the thirteenth house on the street was destroyed by a hurricane and the other houses were not)? I think not. To hold that the particular number in itself is unlucky and capable of affecting and explaining physical events is very much like saying that the Platonic Forms might all on their own affect the material world, and, of course, Plato himself precisely didn't say this, but rather in the *Timaeus* invoked the Demiurge to explain how and why things happen in the material world. We have reason to believe that numbers are too abstract to be able to causally explain things in the physical world, and so in addition to the fact that the fact that thirteen is the particular number it is cannot explain physical events, it cannot explain such events *because it is just a number*.

The present example thereby helps us to see that there are at least two ways in which (the truth of) physical explanations may be impossible. A certain kind of ultimate physical explanation may be metaphysically impossible on a priori grounds because it relies on a certain kind of particularity, but other sorts of explanatory physical fact are impossible because of the general concepts that would apply to them, the general kinds of factors they would have to be based on or in. Numbers cannot explain because they are numbers, and this takes us beyond particularity.⁶ But just in case you aren't entirely convinced, let me mention another

⁶ I have not mentioned psychokinesis, but what I have been saying pretty clearly entails that "pure" psychokinesis is metaphysically impossible. Is that plausible? Well, it is interesting that defenders of psychokinesis have typically gone in to offer further explanations of what happens when mind influences distant bodies. For example, in their famous/infamous paper (Mattuck and Walker 1979), R. Mattuck and E. Walker argue that psychokinesis is underlain by quantum phenomena. This paper has been roundly criticized for the specific theory it offers, but the main point for my purpose is the fact that they were not satisfied to treat psychokinesis as a pure phenomenon subject to no further explanation. Other theorists have offered different possible explanations of psychokinesis: e. g., via a fifth force additional to those physics already acknowledges, but this too fits well with the idea that the pure thing is impossible. However, in (Broad 1949), C. D. Broad offers an account of psychokinesis in terms of our having extended intangible and invisible bodies as a possible alternative to the pure theory, but also says that the pure theory might be true. Others are somewhat inclined to disagree with this. In (Candlish 2007, pp. 67, 307 and passim), Stewart Candlish suggests that pure psychokinesis may very well be impossible in principle, but doesn't state this definitively. He also compares psychokinesis to magic. (He is not the only author who does this.) My own take on this literature is that it should be considered together with the whole supposed realm of magic. When we do that, I think we are led toward the conclusions reached in the main text, and this implies or entails that pure psychokinesis is impossible. I think similar points can perhaps be made about astrology and the idea that heavenly bodies affect (at a distance?) human personalities. This sort of thing may *au fond* constitute magic in the sense we are arguing is impossible. Finally, let me mention David Robb and John Heil's insightful article on (Robb and Heil 2008). At the end of section 2.2 they consider the supposed possibility (defended by some dualists they mention) that particular individual souls might have the power to influence only one particular body and they compare that idea to holding that a given key

example where certain general kinds of numbers simply cannot explain physical facts in any ground-floor way.

This example comes from a private discussion I had with Robert Nozick more than forty years ago. Nozick was interested in questions about the nature and existence of God, and noting that the empirical evidence for God's existence is unclear at best, he mentioned to me a possible case, a possible universe, where intelligent enough beings would definitely have evidence that there is a God. He suggested that astronomers might discover or might have discovered that every solar system they investigated had a prime number of planets in it (including our own, as was imagined in the days when there were thought to be seven planets). This, he said, and I agreed with him, would be evidence that there was a God and evidence, moreover, that God wished to reveal his (or her or its) existence to sufficiently intelligent beings.

However, in agreeing about all of this, *neither of us ever considered the possibility that the fact that every solar system had a prime number of planets might be a basic physical fact about the universe*; and I think that is because both of us were implicitly assuming such a physical explanation was impossible, made no coherent sense. The hypothesis of God had to be the explanation (if any explanation was possible) of the physical fact that there were only prime numbers of planets in every given solar system. (We should probably imagine further that there are not only different prime numbers of planets for different solar systems, but also that in some cases the number was relatively high: like 101 planets in a given solar system and 103 in some other, but never 100, 102, or 104 planets in any given solar system. We could make the thing even more evident if we talked of paired prime numbers of planets or of perfect numbers of planets, but enough is enough here.)

I think this example makes it even clearer why numbers or general facts about numbers cannot be ultimate physical explainers. Again, the supposition that the primeness of numbers ultimately explains certain physical facts seems to smack of the confusion one could have accused Plato of if he had treated the Forms as capable of shaping the physical/material world. This sort of explanation doesn't invoke magic, but it somehow confuses different levels or realms of reality. Gottlob Frege in *The Thought* (1918 – available on-line) spoke of a third realm of entities to which thoughts, or Gedanken, belong – the other two realms being the mental and the physical. And the fact that numbers seem more to be associated with the

might have the power to unlock one particular lock and no other exactly like it, claiming that "...it is by no means obvious that powers *could* be individualistic in this sense." The parallelism they draw between individualistic mental causation and individualistic purely physical causation resembles what I have been saying here about particularity, but Robb and Heil are not as committed as I am to denying such possibilities.

third realm presumably has something to do with the fact that particular numbers and general facts about or properties of numbers cannot explain physical events or realities.

The idea that the primeness of numbers could explain physical facts about solar systems doesn't seem exactly to be an instance of *magical* thinking, but in any event what we have said about that kind of example and about others where magic is definitely supposed to be involved shows us that the metaphysical impossibilities that exist with respect to the physical really do run parallel to those we have unearthed regarding what *xin* can contain. Among both the physical and the psychological cases of metaphysical impossibility particularity can be and often is a (philosophically) explanatory factor, but considerations other than particularity are relevant to metaphysical impossibility in other instances.

At this point, though, rather than end our discussion of this parallelism between the psychological and the physical, I want to illustrate and enrich the general points being made here by speaking of another kind of example of putative physical explanation where what is often thought of as merely contingently non-existent turns out (on a priori grounds) to be metaphysically impossible. This further example concerns magic spells and incantations and magic words or phrases (like "Open sesame!"). Does it really make sense to think such spells can work in the way we are sometimes asked to think of them: as ultimate explainers of physical events. For Ali Baba, saying "open sesame" caused a cave door to open, and in other cases magic spells or incantations are thought of as having immediate effects in or on the world. (These words are used in "Ali Baba and the Forty Thieves," a story that comes from later versions of *A Thousand and One Nights*, a collection ultimately of Islamic origin.) Of course, many spells have counter-spells, but there doesn't seem to have been any counter-magic to block the efficacy of "open sesame," and even where there is a counter-spell, the point is that the spell is efficacious if the counter-spell *isn't* invoked. Could the saying of certain particular words in and of themselves and without any deeper or further explanation be efficacious in the way magical thinking supposes?

It is worth noting that in the case of "open sesame" and in many other cases of supposed magic as well, the incantation bears a semantic relation to what is supposed to happen: the cave is supposed to open. Perhaps this is no accident and can give us insight into what is supposed to happen or be possible when a magic spell or magic words are uttered. Why should a cave door open to words telling it to open rather than to words telling it something else? Couldn't it be basic that the door would open to the words "close sesame"? Well, no believer in magic and no tale about magic would ever suppose such a thing, and I think the reason, the deep reason, why that is so is that the magic is supposed to work at a

linguistic/semantic level, as if the door understood the words and only responded because of what they mean. But this is truly incoherent, and I am inclined to say that similar incoherence attaches to what is being supposed in other cases of magic spells or phrases. Physical things don't and can't understand language unless, possibly, they are governed by software and hardware that allows them to do that. But in the case of Ali Baba's cave no such thing was being supposed. There is something really quite absurd in the idea that spoken words can govern physical realities without their being any further or deeper physical mechanism by which they work. For example, the doors of a household can be set up to respond to voice commands like "open" and "close" but this doesn't just happen because those words are said. There have to be underlying physical mechanisms and software that ensure that the system works, and, again, we are precisely assuming that there is no need for such things when we speak of phrases like "open sesame." The whole idea of the magical efficacy of certain words just doesn't make sense and represents something that metaphysically cannot be.

Let me say just a bit more deriving from our example of "open sesame." Could there be a world in which every time anyone wished for something, the very opposite happened or remained the case and where this was an unexplainable basic fact about events in physical reality? Clearly, such a supposition is absurd, but its absurdity shows there to be something similarly absurd about the idea of a world where willing something to happen in the world automatically leads to its happening. It seems absurd to suppose that the world might automatically counter our wishes because it is absurd to think the world has thoughts and desires about us. What other than a desire to counter what it understands our wishes to be could explain why the universe always produced the opposite (in some sense) of what we wanted or willed to happen? So the idea that it could be basic to the universe that things happen contrary to what people wish for makes no sense, describes what is metaphysically impossible, and what we say about this kind of case transfers readily to the idea of the universe's always producing what we do will or want. This too seems to suppose that the universe understands us, and it supposes in addition that the universe is favorably disposed toward us, and none of this makes sense or is possible. In a way, the idea that there could be some sort of connection between willing and what happens in the universe anthropomorphizes a universe that is at the same time regarded as not being ensouled, and this is a logically lethal combination: we could call it "logical animism." In a nutshell, then, and to return to our specific example, if it is impossible for "close sesame" to have magical efficacy, then neither, in the end, is such a thing possible for the words "open sesame."

So the category of what is physically impossible appears to be just as rich with

impossibilities as what we saw in connection with the psychological category that includes beliefs, desires, attitudes, etc., that metaphysically cannot be.⁷ And given our previous arguments, it follows that, with respect to the physical realm at least, philosophers (not to mention the general public) have held very mistaken views. They have assumed that magic is metaphysically possible at the same time they supposed there to be no such actual thing or phenomenon, whereas the picture I have been offering here entails that they or we have all been mistaken on the issue of metaphysical possibility.

Perhaps we should shy away from attributing such widespread error, but is the case really very different from what Saul Kripke says about fictional creatures? We all tend to think that Pegasus and unicorns are metaphysically possible but just not actually existent, but Kripke's reference-fixing semantics entails (though this is a very informal way of putting it) that Pegasus and unicorns not only *don't* and *didn't* exist but never could have existed. This runs parallel to what I am saying about magic, and perhaps there is safety in numbers here, not to mention the possible strength of the arguments I have offered for my conclusions.⁸

Overall so far, this paper has explored a rather extensive parallelism that exists between the psychological and the physical and has attempted to show that magic is a metaphysical impossibility. But let me now indicate what I take to be the most important implication or set of implications of what we have been arguing for so far.

3 From the Impossibility of Magic to the Uniformity of Nature

What we have been saying here about magic can lead us toward questioning a fundamental assumption about reality that both Hume and Kant made and that most (analytic) philosophers today also make. That assumption is that the uniformity of nature is not a given, is not guaranteed a priori or with metaphysical necessity. We all know that Hume made this assumption, but Hume's enormous influence on Kant largely depends on the fact that Kant appreciated Hume's point and thought the only way around it was to distinguish phenomena or appearances

⁷ I also hope it is clear that the parallelism between the psychological and the physical that I have been describing has nothing to do with psychophysical parallelism, the view that the physical and mental/psychological run parallel but never causally affect each other.

⁸ See (Kripke 1980), especially Lecture 3. Incidentally, people tend to think that there are no such things as monsters but that monsters could have existed. But any living creature has to have a determinate biology and wouldn't count as an "unnatural creature" of the sort we conceive monsters to be – only monsters in fiction can be thought of that way. So in parallel with what Kripke says about unicorns and I am saying about magic, it seems a mistake to regard monsters as only contingently non-existent. On this see (Slote 2010).

from noumena or things in themselves. Philosophers today seem largely to acquiesce in Hume's view of this matter and mainly look for non-Kantian ways of dealing with the issues about induction Hume raised.⁹ But if we say that nature has to be uniform in Hume's sense, that the future has to resemble the past, we are advocating a further metaphysical limit or limitation on reality beyond those discussed above, one that, I think you will agree, is or would be far more philosophically significant than any of those mentioned and argued for earlier in this paper. But at the same time that further conclusion seems to me to be supported by what was said earlier about the metaphysical limits of what reality can accommodate, and I shall shortly explain how this works. For the moment, however, let me give a bit of background for what I shall be saying.

Those who even today – and that includes most of us and myself too up till very recently – regard the uniformity of nature as lacking any necessary metaphysical backing do so in relation to normal predicates and scientific categories. If you bring in Goodman-like predicates like “grue” (“green if examined before now and otherwise blue”), it becomes in one sense easier to maintain the necessary uniformity of nature: whatever happens, some universal law making use of a Goodman-like or of a normal or familiar predicate will inevitably hold, and nature will in that sense and to that extent be uniform. But of course if nature is uniform in relation to Goodmanian predicates, it won't be uniform with respect to ordinary predicates, so one might conclude on that basis that it is impossible for nature to be uniform in every way, or that the whole idea of uniformity is too predicate-relative to be a clear or useful notion. Therefore, when typical philosophers assume that nature needn't be uniform, they do so independently of what they think about the implications of Goodman's thought; and I am going to argue that if we stick to the kind of (Humean or pre-Goodmanian) thinking such philosophers engage in with respect to the uniformity of nature, it turns out that, contrary to common philosophical belief, nature has to be uniform.

Now above I defended the view that no intelligent being could, metaphysically could, think inductively in terms of grueness rather than greenness, but even if that is correct, one might still hold that it is metaphysically possible that emeralds observed (if at all) only after now will all be grue and therefore blue. Even if, given present evidence, one has to *think* or *infer* that future emeralds will be green, it still seems possible that those emeralds not be green but rather blue. More

⁹ On Hume's present-day influence regarding this point, see (Schwartz 2009). Hume's discussion of induction and the uniformity of nature occurs both in the *Treatise of Human Nature* and in the *Enquiry Concerning Human Understanding*. Kant's discussion of Hume's views on this topic (which is often mixed in with discussion of Hume's ideas about causation) can be found both in the *Prolegomena to Any Future Metaphysics* and in the second edition of the *Critique of Pure Reason*.

generally, even if one holds that no one can *think* the future will be totally unlike the past, one may still hold that the future *might/may* be totally unlike the past (our past). This last belief seems common to philosophers of the Western tradition, but I want to try to persuade you now that there are reasons for doubting it based on what was said here earlier.

Our discussion above questioned, among other things, whether magic causal particularity makes any sense. If someone tells me of a door that opens just because the magic words “open sesame” were said in front of it (and not because there is some physical device governing the door that is sensitive to the particular sound waves that exist when one says these words), I am not going to believe them because, for all the reasons mentioned above, what they are saying doesn’t make any metaphysical sense. By the same token, it makes no sense to think of “Change to blue!” as special words whose utterance magically can change a green emerald into a blue one. Now Goodman’s riddle doesn’t depend on any emerald changing from green to blue, but many writers on the riddle make the mistake of assuming that it does.¹⁰ And the mistake, I think, is a natural one because what the actual riddle requires us to imagine, that someone infers from past green/grue emeralds that future ones will be blue/grue, seems to require, for ordinary ways of thinking, an inexplicable epistemic shift in someone’s beliefs about emeralds: from seeing past ones to be green to thinking future ones (I am speaking roughly) will be blue.

Well, those who have imagined that Goodman’s riddle is about or can be about emeralds inexplicably changing from green to blue have substituted an inexplicable metaphysical event for an inexplicable epistemic shift in someone’s thinking, but their misinterpretation constitutes a kind of appreciation of just how inexplicable any green/blue epistemic or metaphysical shift would be. *And this is entirely consonant with received modern and recent views about the uniformity of nature.* If (as those who misunderstand the riddle imagine) it is possible for an emerald to shift unaccountably from green to blue and if the epistemological problem raised by the riddle concerns the justifiability or unjustifiability of the possible belief that such a shift will occur, then, given the truth of that belief, the future of emeralds will not fully resemble their past, but there will be no specific causal reason why this possible change should occur. And the emeralds can be a microcosm of the universe as a whole. If it is possible for an emerald to shift unaccountably from green to blue, why shouldn’t this happen *mutatis mutandis* and with a larger complement of properties and things to the universe as a whole? So this thinking about what is metaphysically possible for emeralds is just an instance of the more

¹⁰ D. M. Armstrong in (Armstrong 1983, p. 58) treats the riddle as involving emeralds’ changing from green to blue and others have made the same mistake. The fact that it is a mistake has been frequently pointed out. See, for example, (Schwartz 2009).

general and widely held belief that nothing metaphysically ensures that nature is uniform, that the future will resemble the past.

But does it actually make sense to assume that an emerald might change color for no reason at all? If it makes no sense to assume that *particularistic magic* could bring about such a change, do we really have reason to hold that it makes sense to assume that such a change could occur without there being *any causal-explanatory reason* (embedded in all emeralds, say) for it to occur? Yet that is precisely the sort of thing that belief in the possibility that nature isn't uniform involves, a shift in nature or the world that isn't due to factors operating previously in the world. If it is (seen as) due to such factors, then nature is (being conceived as) uniform and regular, though at a higher or more abstract level than was previously realized. And (once again) I am not talking here about Goodmanian predicates. If one cannot simply believe that previously unobserved emeralds will be unlike those one has already observed, then neither could anyone think that unobserved grue emeralds resemble observed ones more than unobserved green emeralds do, and in that case the uniformity of nature also cannot be conceived in terms of Goodmanian predicates. The "typical" philosophers I mentioned earlier are actually conceiving the uniformity of nature in the only way in which it is possible or makes sense to conceive it.

Now someone might object at this point that since electrons can be undetermined in their movements, it makes sense to suppose that emeralds might be undetermined in their color and so for no deterministic reason sometimes shift from being green to being blue. But it is part of the nature of electrons that their movements are or can be indeterministic. That hardly means that everything about electrons is indeterministic and inexplicable, and when an electron moves indeterministically, that is in accordance with the laws and regularities that govern electrons. A higher-level explanatory theory makes room for the indeterministic movement of electrons, and a parallel in the case of emeralds might be that they contain electrons whose indeterministic movements cause them to change color (let's ignore the implausibility of this assumption relative to present-day physical theory). But this would not be an uncaused change of color of the sort imagined by those who misunderstand Goodman's riddle; rather and to the contrary, the change would causally depend on uncaused smaller motions. This is far from magic and does nothing to undercut the general uniformity of nature.¹¹

However, someone might then speculate that emeralds might change color indeterministically or without cause and do so *independently* of the indetermin-

¹¹ By the same token, if there is a bomb that for lawlike physical reasons can destroy the universe as we know it and the bomb goes off with precisely that effect, we haven't got an instance of the non-uniformity of nature.

istic movements made by the particles they contain; but this is dubious because it suggests that what happens to a thing can be independent of what happens to the entities it is constituted of. In any event (and independently of the issue just raised about emeralds, which is applicable to the universe as a whole), if the universe changes deterministically over time, it may well end up being very different from anything we have expected, but there is no reason to hold that such change would be incompatible with our offering a true general explanatory scheme or theory about how the universe operates and has operated, and such change will therefore do nothing to undermine the idea that nature as a whole is uniform. The resemblance and uniformity between future and past will just exist at a higher level or be more complex than what we ordinarily imagine it to be, and the most that would then be true is that we didn't know the (causal potentialities of the) past world all that well and so didn't (fully) know the *nature of the uniformity* that governs the universe.

Here is another way to reach the same conclusion. For nature to be or become non-uniform, it has to change (relatively) suddenly and as if by magic lose the power to propel/perpetuate itself into the future. If, as I argued earlier, the existence or (therefore) the onset of positive or active magic power (or regularity) is impossible at any given time, then there seems just as much reason to say that that a sudden magical *lapse, loss, or deflation* of power (or regularity) is metaphysically impossible too. But that is just what denying the necessity of uniformity involves, so the universe turns out on philosophical/conceptual grounds to be necessarily uniform in the sense relevant to Hume's skeptical worries and Kant's first *Critique*. It is harder to coherently conceive nature as non-uniform than we have realized, and if the arguments I have been offering have any force, then they obviate the need for the distinction between noumena and phenomena that Kant thought was necessary to combatting Hume's views about the a posteriori character of nature's uniformity¹². Hume may simply have been wrong about the possibility of nature's lack of uniformity, though it may not be easy to see that until one sees the relevance of magic and of its metaphysical impossibility to this whole issue. That is the main upshot of what I have been saying in this essay.

¹² In a way Kant's approach to the uniformity of nature and the one taken here are diametrically opposed. Kant sought to demonstrate the necessary uniformity of nature by arguing that a certain kind of causality (based on Newtonian assumptions) is *necessary* to the *appearances of things*. I have sought to show the necessity of such uniformity on the basis of arguing that a certain kind of causality (magic causality) is *impossible* with respect to *things simpliciter*. In addition, there is general disagreement as to how well Kant demonstrates universal causation in the Second Analogy of Experience and elsewhere. I personally have always found his argument quite unpersuasive, beginning when I was Charles Parsons's assistant many many years ago in the Kant course at Harvard. That is at least part of what has motivated the approach I have taken here.

But before we close up shop on these issues, let me briefly connect what has been said just now with what Hume famously said about induction (though he never uses that specific term). Among other things Hume held that when we make any inductive inference from past to future (e. g., from the color of past emeralds to that of any future emerald), we have to assume that nature is uniform; and Hume thinks this assumption cannot be metaphysically guaranteed or assured a priori and can at best only be justified in terms of previous or other inductive arguments (which leads to a justificatory regress). Most philosophers think this gives us at least some philosophical reason to doubt the validity of inductive inferences, but the doubt rests on the assumption that the (principle of the) uniformity of nature is purely contingent, *and that is precisely what our previous arguments call into question*. I think we can conclude, then, that Hume's original doubts about the uniformity of nature can be answered and that the inductive skepticism he (is often thought to have) defended based on what he said about the uniformity of nature can also be answered.¹³

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¹³ In an article published many years ago that deserves more present-day attention, Wesley Salmon convincingly argues that even if the principle of the uniformity of nature is true and known to be true, that won't by itself help us to justify particular inductions: see (Salmon 1953, p. 42). Salmon's reasoning can be stated, roughly, as follows: If I have seen nothing but black crows, this may nonetheless be part of a pattern of variability with respect to color in crows that would be consistent with the uniformity of nature. So the uniformity of nature doesn't in itself tell us that we have reason (even other things being equal) to make the usual and supposedly justified inference that the next observed crow will probably be black. Knowing that some natural seeming regularities have to be true might not help us, on the basis of our empirical sampling of events and objects in the world, to in any way identify which ones they are. I say that Salmon's argument convinces me, and I mention it because the argument of the present paper doesn't actually assume that the uniformity of nature justifies induction. If Salmon is right, then Hume is simply mistaken to think that we could argue for specific inductive conclusions if we were somehow allowed to assume nature's uniformity. But the reason why the assumption of the uniformity of nature doesn't help us with specific inductive inferences is that it is too general to do that: nature can be uniform independently of any specific such inference or its reasonableness.

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