**Material Possibility**

The Terminist revolution in logic created a distinction between formal logic, which concerned terms and propositions as abstract objects (“objects of second intention”), and material logic, which concerned the application of logical forms of inference to real-world contexts. This material logic was considered an *organon*, or method for governing theoretical inquiry, and the foundation for all substantive knowledge (*scientia* in its original sense), including natural science. While treatises on material logic continued to be written as late at the seventeenth century, the division between formal and material logic was one factor in the increasingly formal emphasis in logical studies and the increasingly empirical emphasis in natural science.[[1]](#footnote-1) As logic become more formal – ultimately, the study of “relations of ideas” and formal patterns of inference, it became a separate, formal science without direct influence on our substantive beliefs. Instead, the province of logic shrank mostly to the task of evaluating reasoning independently of its content. Thus, deductive arguments were classified, tests for their formal validity or invalidity discovered, and formal fallacies (such as affirming the consequent) identified. That is where the formal logician’s competence with regard to the normative evaluation of reasoning must end; the evaluation of the truth and falsity of the premises must reside in other sciences.

 In a parallel movement in thought, the separation of formal from material logic contributed to the downfall of the Aristotelian logic, first as material and ultimately as formal. Once distinguished, it became possible to retain one’s commitment to Aristotelian logic (understood formally) while rejecting it as an organon or as normative for real-world contexts such as the investigation of nature. Freed from the procrustean bed of Aristotelian metaphysics and its doctrine of “saving the appearances,” natural science blossomed under its own dynamic, rejecting Aristotelian doctrines of act and potency, substantial forms, and teleology in nature in favor of mathematical models based on an idealized mechanics applied to natural processes, culminating in the eighteenth century Newtonian physics familiar to Kant and Laplace. In the same way, as formal logic found its footing and the limitations of Aristotelian formal logic were discovered, a revolution in formal logic – which Kant had declared completed and irreformable in 1781 – was precipitated in the nineteenth century, culminating in modern symbolic logic in the twentieth, of which perhaps the semantic interpretation of modal logic in the 1960’s and ‘70’s represents the high-water mark.

 These are signal contributions to thought and taken to be full confirmation of their essential correctness. Nevertheless, as these approaches to logic and natural science seem to have reached their limits and exhausted their fecundity, becoming increasingly distant from anything that we can describe as real or actual and more and more merely free-standing formal/mathematical constructs, it may be time to recover some of the Aristotelian ideas that those perspectives rejected, and to look for a rapprochement between the formal and material aspects of theoretical inquiry. For example, despite the universal scorn and contempt heaped upon act and potency, substantial forms, and telic principles in nature by modern scientists, it remains (as I have argued at length elsewhere) that to any unprejudiced mind the existence of natural teleology is a palpable fact.[[2]](#footnote-2) Indeed, unless human thought is teleologically ordered and nature capable of being grasped in functional/teleological terms, natural science itself is impossible as a mode of theoretical inquiry capable of arriving at the truth about reality. A material logic, animated by Aristotelian principles but cognizant of modern scientific practice may help to integrate these two perspectives into an overall synthesis.

 In the same way, the Humean/Kantian doctrine that logic concerns only relations between ideas, concepts and propositions, and formally schematized patterns of inference, so prominent in twentieth century thought, is clearly open to objection. As I have argued elsewhere, the dogma that purely formal claims cannot entail substantive consequences admits obvious counterexamples.[[3]](#footnote-3) From the fact that certain things, events, and states-of-affairs are formally impossible (i.e. cannot be conceived without contradiction) we can, as we routinely do, conclude that those putative objects are existentially impossible, i.e. necessarily non-existent, as well. Thus from the fact that square circles, two-sided triangles, mountains without valleys, things that are red all over and green all over at the same time, older or taller than themselves, etc. are formally impossible it also follows that none of these things actually exist, for the very simple reason that none of them can exist, since to do so would require that they exemplify contrary, mutually exclusive natures or properties. Indeed, in what follows I shall argue that, despite its extrinsic certainty when clearly and distinctly conceived, formal impossibility is a derivative rather than basic a form of modality.

 I shall concentrate on the notion of possibility because it seems to me that one area of logic in which a rapprochement between formal and a suitably updated material logic is easiest to effect, given the widely accepted thesis of the inter-translatability of *de dicto* and *de re* modalities.[[4]](#footnote-4) In the account I will give in this paper, the first of several I hope to write on this topic, I will distinguish material possibility as the central modal notion, and relate it to the other forms of modality/possibility that philosophers have or might usefully have distinguished. This will be sufficient to give the general outline of the theory, which I hope to apply to good purpose in subsequent essays on this topic.

**Formal Impossibility and Possibility** Contemporary philosophers often treat possibility as though it was completely conceptual or *a priori* in nature, concerning only what is coherently imaginable or conceivable “without contradiction.” These, in turn, are often taken to be something that is introspectively primitive or self-evident to the gaze of rational intuition, and thus both further unanalyzable and foundational for our thinking about possibility. On this view, we are able to determine whether or not something is logically possible through a simple act of imagination that is otherwise without presuppositions. Such a view finds evident support in the fact that whatever is *in*conceivable in that sense, i.e. *in*capable of being coherently conceived because that which we attempt to conceive of contains an evident contradiction, is clearly logically impossible. It is therefore not at all surprising that we naturally suppose that, since whatever is not impossible is possible, whatever is coherently conceivable or conceivable without contradiction must be possible as well. However, there are some obvious difficulties with this sort of view that suggest that the matter is more complicated than those who espouse it suppose.

 In the first place, imaginability in relation to the human ability to form contentful mental images in the imagination is neither necessary nor sufficient for logical possibility. It is not necessary, since (as Descartes notes) neither a hundred-sided figure nor a chiliagon are capable of being imagined by us in the foregoing sense, though both are mathematically conceivable independently of mental images. Both are thus known to be logically possible in the alternate sense of being conceivable without contradiction without being represented by a mental image in the imagination. Nor is imaginability in that sense sufficient for logical possibility. It is not sufficient for logical possibility, since some states-of-affairs that are clearly imaginable in that sense are logically impossible. For example, I can imagine a mathematician proving that Goldbach’s conjecture is true, and also imagine a mathematician proving that Goldbach’s conjecture is false. However, since Goldbach’s conjecture is a mathematical truth, and thus necessarily true if true at all, at least one of these apparently coherently imaginable scenarios represents a logically impossible state-of-affairs.

 Nor is conceivability without contradiction, considered in relation to a judgment based on a mental inspection of the content of a mental image or the meaning-content of a proposition sufficient to determine the logical possibility of its object. There is no apparent contradiction to be discovered in either scenario considered in the previous example – if there were, we could know whether Goldbach’s conjecture was true by means of mere mental inspection. In the same way, there is no obvious contradiction in the claim that it is possible that no prime number exists between 13 and 19. Nevertheless, since the number 17 is between 13 and 19 and 17 is prime, the claim to the contrary is necessarily false and thus cannot possibly be true. As such, apparent coherent conceivability is at best sufficient for *epistemic* possibility, a subjective form of possibility relative to what an individual happens to know at a particular time or in a particular context.[[5]](#footnote-5) In the same way, the apparent coherent conceivability of my existing independently of my body does not, by itself, show that this is a possible state of affairs.[[6]](#footnote-6) Even so, it remains that in at least some cases, we clearly, distinctly, and directly apprehend that a certain state of affairs is inconceivable and that in such cases the envisaged state of affairs is logically impossible. This fact stands independently of anything I have said so far.

 However, even with regard to this sort of direct apprehension of logically impossibility, we need to distinguish between two kinds of inconceivability, which I call inconceivability in the conception and inconceivability in the conceiving. In both cases we find that the attempt to imagine something results in a contradiction; however, the location of the contradiction is different in each case and only the first is relevant to the question of the logical possibility of what turns out to be unimaginable. In inconceivability in the conception, the contradiction in question is given as the explanation of my inability to imagine the object of that act. Thus, square circles, two-sided triangles, things red and green all over at the same time, things older or taller than themselves, and so on, are neither imaginable in the foregoing sense nor otherwise conceivable due to the fact that the objects question are inconceivable without contradiction. More needs to be said about what this means, but in this case it should be clear that the contradiction is to be found in the very nature of what we are attempting to conceive of, thus in our conception of it as captured in a concept expressible in language using a word or phrase.

 In the case of inconceivability in the conceiving, the contradiction arises from the very act of conceiving itself, rather than from the object we are attempting to conceive. According to Berkeley, for example, I cannot conceive of anything existing outside of the mind. His “master argument” for this claim is that I cannot conceive of anything existing unperceived, in the broad sense of existing out of relation to any mind.[[7]](#footnote-7) For, he says, conceiving is a kind of perceiving in that broad sense, so that is to conceive of something existing unperceived is precisely to conceive of it, and thus perceive it. However, it is clear in this case that, while it is impossible for me to conceive of anything existing unperceived, the contradiction involved here is to be found in my act of conceiving itself, and not the object conceived of. As such, it does not follow from the fact that I cannot conceive of something existing unperceived *in this sense* that nothing can exist unperceived.

 More than this, especially where the standard of apparent coherent imaginability is concerned, we can seriously question whether we have available to us a successful standard for logical possibility. I can quite clearly imagine (meaning by this “form the mental image of”) a talking cannonball or of a horseshoe that sprouts legs and tap-dances to *The Oceana Roll*. Yet one might well question whether such “beings” are logically possible after all. It does not take much reflection to wonder whether such a thing as a cannonball could really be just a cannonball – a solid, spherical lump of iron – and yet actually possess the power of articulate speech or for an iron horse shoe *just as such* to be attached to limbs capable of elaborate choreography. Although there is no apparent contradiction in these suppositions – they are at the very least *imageable* in a way that square circles, two-sided triangles, and mountains without valleys are not – it still remains doubtful that such fanciful entities are really coherently conceivable (with or without contradiction) on the basis of that fact alone. Imaging and imagining may well be two different things and in any case in which there are genuine, substantive doubts about the matter, we do well to withhold our assent to the spontaneous judgments about possibility they evoke.[[8]](#footnote-8)

 I conclude, then, that the logical impossibility of a state of affairs can only be clearly, distinctly, and directly apprehended when its inconceivability is due the unimaginability of its object, when this in turn is the consequence of a contradiction in its very conception. It follows that, in the case of the logically impossible, the phenomenological evidence for the impossibility of whatever we are attempting to conceive of is positively present as part of the content of that mental act of imagining. We fail to conceive of, say, a square circle not simply through our inability to constitute the image of such a thing in our imagination, but also in virtue of our recognition that our inability to do so is a consequence of the very nature of the putative object of that act. However, now we need to ask: how is this fact revealed to and thus positively apprehended by us? The standard answer, of course, is that this is the case through our apprehension of the presence in that nature of incompatible or mutually exclusive attributes both of which are simultaneously predicated of the same subject and the subsequent recognition that the resulting conception contains a contradiction. On the one hand, no subject can possess both of these attributes simultaneously, due to their being mutually exclusive. On the other, we are directed to conceive of this subject as an object instantiated both of these mutually exclusive attributes. This explains why that object is neither imaginable for us nor conceivable without contradiction.

 So far so good – this is where the analysis usually ends. In this essay, however, the foregoing conclusion is only the starting point of the analysis. I shall go on to argue for the priority of the Aristotelian account of possibility, according to which all possibility, including logical possibility, is parasitic on prior actuality, along the lines suggested by Kant in his pre-critical work known as the *Beweisgrund*.[[9]](#footnote-9) I will thus present an account of what I will call *material possibility*, which I regard to be the most basic conception of possibility, explore this notion, and then use it to explicate other widely accepted notions of possibility, especially that of logical possibility. The hallmark of this account is the claim, contrary to the reigning point of view, that material possibility is prior to and foundational for logical possibility and thus that actuality precedes and grounds logical possibility rather than the other way round. Having completed this analysis, I propose to extend it to the notion of contingency as well. In subsequent papers I hope to further develop and apply this account of possibility.

**The Foundation of Logical Possibility** The traditional view, that takes self-contradictory and impossible as the foundation for the non-self-contradictory and the possible, yields only the *formal* account of these notions, guided primarily by intuitive judgments about individual cases that treat possibility solely in terms of relations between ideas, concepts, and other *abstracta* or the contents of mental images. This leads logicians to spin out systems of symbolic modal logic for which possible worlds semantics provide an interpretation that is then given a metaphysical cast and application. I have nothing against such formal accounts of logical possibility as far as they go, or any intention to dispute either their results or their usefulness. However, I do wish to question the completeness of these purely formal accounts of possibility and suggest a different approach to this question, one inspired by Aristotle and the pre-Critical Kant. Instead, I want to suggest that a full and proper account of modality requires a substantive, material interpretation of these modal notions from the very first.

 Formal impossibility, understood as that which is inconceivable without contradiction, is often paired with Formal possibility, lack of apparent internal contradiction, as its proper contrary. However, as we saw in a previous section of this essay, these two notions are not really parallel to one another. Whatever is formally impossible is impossible in every other sense that we use that modal notion – epistemically, logically, physically, really, and existentially. Formal possibility, however, is at best sufficient for epistemic possibility and at most necessary for any other form of possibility we care to distinguish and analyze. The suggestion that I am following here is that it is full-blown *actuality* that is the true complement and parallel to the notion of formal impossibility. Actuality proves possibility and entails every form of possibility we care to distinguish – epistemic, logical, physical, real, existential and (trivially) formal possibility as well. The analysis of possibility, then, most reasonably begins from that of actuality rather than the other way around.

In the *Beweisgrund*, Kant notes that our ability to recognize that two attributes are mutually exclusive is based on a prior apprehension of each of those attributes, hence not logically primitive even if phenomenologically immediate. Only if I clearly and distinctly apprehend the natures square and circle can I see that they are incompatible with each other and thus cannot both be instantiated in the same subject. As such, my ability to recognize that the instantiation of a certain complex of attributes in a single subject is inconceivable, and thus that any attempt to conceive of that subject as an object of imagination or conception must fail, depends on a prior grasp or apprehension of the elements of that complex as positively conceivable taken in themselves. Thus, inconceivability presupposes conceivability, which is thus more primitive than inconceivability. To put it another way, inconceivability is parasitic upon, and presupposes, prior conceivability.[[10]](#footnote-10)

 Impossibility involves the instantiation of incompatible attributes in a single subject, from which arises the internal contradiction in the nature of that subject that makes it inconceivable as an object either of imagination or conception. In turn, then, impossibility is conceivable only against the background of prior, positive possibilities conceivable in themselves without contradiction. It is only due to the fact that I already apprehend certain things as possible, in and of themselves, that I can judge that others are derivatively impossible. The conceivability of the impossible is thus parasitic on the positive apprehension of the possible. It will not do, then, to *define* the possible as whatever is conceivable without contradiction, since the conceivability of that which is contradictory crucially depends on our prior apprehension of that which is non-contradictory.[[11]](#footnote-11) In the same way, the apprehension of the impossible crucially relies on our prior positive apprehension of the possible. As such, the self-contradictory and the impossible, though extrinsically certain for us when they are clearly and distinctly apprehended in particular cases, nevertheless are derivative from and analytically posterior to the non-contradictory and the possible. We cannot therefore analyze the latter by reference to the former.

**Possibility and Being** Formal logical accounts of modality, hence of the notion of possibility, have the air of the ivory tower about them. That in itself, of course, is nothing against them. However, everyday judgments concerning possibility concern the existence of things, the occurrence of events, or the obtaining of states-of-affairs. This is what such judgments are about, their subject matter – we speak, for example, of the possibility of life on other planets. In the same way, we often refer to things, events, or states-of-affairs as possible or even as possibilities as though this were a property inhering in or a status attaching to these entities. Much of this, of course, is merely loose talk and (like much ordinary language) may resist any fine-grained philosophical analysis. Nevertheless, it testifies to the fact that we naturally possess a material conception of possibility as part of our common sense view of the world. There is no reason *a priori* why we may not find in such a notion the basis for a philosophically illuminating account of possibility. Such an account, however, will have to come from a material, rather than a merely formal, logic.

 Nor is such an account entirely absent from the philosophical literature. Both Aristotle and the pre-Critical Kant attempted to provide an account of material possibility, part of which I have already used to motivate the present discussion. In his incomplete and flawed account of modal syllogisms, Aristotle distinguishes between three kinds of propositions that can figure in such arguments: apodictic, assertoric, and problematic.[[12]](#footnote-12) Apodictic propositions correspond to our modern necessary statements, problematic ones to modern possibility statements, and assertoric propositions to statements concerning what is actually the case. When cleaned up, the relations between these propositions can be represented by the following square of opposition:

 CONTRARIES

 Necessarily P Necessarily not-P

 (P) CONTRADICTORIES (not-P)

 Possibly P Possibly not-P

 SUBCONTRARIES

Apodictic propositions are on the top, assertoric propositions (in parentheses) in the middle, and problematic propositions are on the bottom, with the arrows indicating the contradictories. It is to be noted that, in this diagram, the relations of contrariety, subcontrariety, and sub- and superalternation which fail for categorical propositions generally hold without difficulty for all cases in modal contexts.

 In the *First Critique*, Kant also includes these three types of proposition in his table of judgments.[[13]](#footnote-13) He then includes them in his table of categories: apodictic judgments express judgments concerning necessity and contingency, apodictic judgments those concerning existence and non-existence, and problematic judgments those concerning possibility and impossibility. This seems vastly different from the contemporary way of thinking about these matters, but the rationale for it emerges when we consider these categories as Kantian transcendental schemata: apodictic judgments concern existence in relation to all times, assertoric judgments concern existence at the present time, and problematic judgments concern existence at some time or other. Thus, if something is such that it is capable of existing at all times, it is necessary; if it exists at some times and not others, it is contingent. If something is such that it exists at the present time, then it is actual; if not, then it is non-actual. If something can exist at some time or other, then it is possible; if not, impossible.[[14]](#footnote-14)

 We can further explicate these Kantian notions as follows. A thing is capable of existing at some particular time if the necessary and sufficient conditions for its existence obtain at that time. A thing is capable of existing at all times only if the necessary and sufficient conditions for its existence obtain at every moment of time; such a being will actually exist at every moment of time. If a thing is such that the necessary and sufficient conditions for its existence need not obtain at all times, in which case it would not exist at those times, then it is contingent. If the necessary and sufficient conditions for the existence of a thing obtain at the present moment in time, then that thing actually exists; if those conditions fail to obtain at the present time, then it does not actually exist. If there are conditions such that if they were to obtain they would be both necessary and sufficient for the existence of some particular thing, then that thing is a possible being. On the other hand, if there are no conditions such that, were they to obtain, they would be necessary and sufficient for the existence of some particular thing, then that thing is not a possible being. Such a being could never exist under any circumstances.

**Formal and Material Possibility** It is important to note two things about the foregoing analyses. The first is that they are concerned with actual, rather than merely hypothetical existence. If the necessary and sufficient conditions for the existence of a thing obtain at a particular time, then it actually exists, and thus we may legitimately infer from the fact that those conditions obtain that the thing in question actually exists. Judgments of hypothetical existence are thus analytically parasitic on judgments concerning actual existence. A being is existentially possible if there are necessary and sufficient conditions for its existence at a time. If there is a time at which those conditions obtain, the thing exists at that time. If those conditions are such that they can obtain at some times but not others, then whenever they do obtain, the thing in question will exist contingently, in such a manner that its prior and subsequent non-existence are not excluded. If those conditions fail to obtain at any time, then the thing in question will be contingently non-existent. Such a being is thus possible (Spinoza notwithstanding) even though it never actually exists. Only a being for which there are no conditions necessary and sufficient for its existence is existentially impossible; such a being could never actually exist.

 The second is that this account of possibility roots the possible in the actual. Rather than treating possibility as an intrinsic feature of *abstracta* such as essences or concepts intuitively apprehensible by pure reason alone, possibility is here treated as a feature of things in relation to their pre-existing conditions conceived of as actual. This assimilates the relevant notions of possibility and impossibility to the Aristotelian distinction between potency and act. Possibility in this sense is a potency with regard to actual conditions that either do or can obtain and which will obtain if and only if those conditions do. In this sense, possibility is parasitic on, rather than foundational for, actuality. On this view, then, there are no *mere* possibilities or possibilities in the abstract.[[15]](#footnote-15) For every possible thing, event, or state of affairs there will be a *matter of fact* whether or not it actually does, did, or will exist, occur, or obtain. This in turn will depend on the prior realization of the relevant set of conditions necessary and sufficient for that thing, event or state-of-affairs to exist, occur, or obtain. Let us call this sort of possibility, which is possibility in relation to a set of prior conditions taken to be actual, *material possibility*.

 We can contrast the foregoing notion of material possibility with that of *formal possibility*, which Kant identifies with the traditional notion of possibility defined in terms of lack of contradiction in the conception. Formal possibility in this sense is clearly a necessary condition for material possibility, since nothing is going to be materially possible unless it is formally so – nothing conceivable without contradiction could actually exist, occur, or obtain. However, in accordance with the Kantian analysis I earlier presented, formal possibility is parasitic upon material possibility as I have characterized it here. It is in virtue of a thing’s nature that it is conceivable without contradiction. Thus, even if nothing is materially possible unless it is formally possible, a thing’s formal possibility is an aspect of, thus a function of, its material possibility. As such, there is no separate question concerning a thing’s formal possibility; having determined that something is materially possible, the question of its formal possibility is moot.

**Logical and Material Possibility** In practice, our only standard for determining formal possibility is apparent coherent conceivability, which in most cases reduces to apparent coherent imaginability. However, as we noted previously, not everything that is apparently coherently conceivable or imaginable is logically possible. This is clear from cases such as Goldbach’s conjecture, which at this date remains neither proven nor refuted. In the same way, what is *apparently* coherently conceivable or imaginable does not always prove to be so in the last analysis or when viewed *ultima facie* as we saw in the case of the conceivability of there being no prime number between 13 and 19. It is apparently coherently conceivable that there be no prime number between 13 and 19 – it may even be epistemically possible for some people to treat this as an open question. In that case, while our intuitions in this area are sometimes so clear and distinct that they confer intrinsic certainty on the judgments they evoke, this is not universally, and may not even be uniformly, the case. We cannot uncritically rest with such intuitions except in those cases in which no grounds for doubt other than those provided by the Evil Genius argument can be entertained. As such, intuitions of this sort are too slim a reed for us to provide a foundation for a successful analysis of the notion of logical possibility.

The foregoing thus suggests that logical possibility may be usefully analyzed in terms of material rather than formal possibility. In one sense, material possibility captures what we might call *real possibility*, i.e. possibility in the actual world. At the same time, however, it is not limited simply to this. In a broader sense, something is materially possible if it is so relative to any set of conditions conceived of as actual, whether they are or not. By extension, then, we could say that, logical possibility concerns what would be the case across possible worlds, regardless of whether that world is the actual world or in some other possible world on the supposition that they were real or actual in preference to this world. Thus, something will be logically possible if it is materially possible in at least one possible world, logically impossible if it is materially possible in no possible world and logically necessary if it is materially possible in every world. Alternatively, and I suspect equivalently, we can treat possible world as ways the actual world would be if it were different in specifiable ways – if there were different physical laws, for example.[[16]](#footnote-16) On either supposition, logical possibility is concretely modeled on material possibility, which then becomes the analytically basic notion of possibility upon which all other notions of possibility are founded either as aspects or extensions. While there is more to the notion of logical possibility as expressed in, say, S5 modal logic than what is captured in this model, it nevertheless remains that the foregoing will be consistent with whatever is essential to the reigning semantics for *de re* modality. That is all that I need in the present context, for claim is that material possibility is foundational for logical possibility, not that the latter is reducible to the former. At any rate, in what follows I shall proceed on that assumption.

 In this scheme, our general analysis of possibility begins from our acquaintance with and apprehension of actuality, and proceeds on the basis of the indubitable principle that whatever is actual is possible – existentially, really, materially, physically, logically, and formally. On this analysis, we do not consider possibility to be a separate or independent notion prior to and normative for actuality, but instead parasitic on that notion, just as the notion of potency is on that of act in traditional Aristotelianism. That which we apprehend as real or actual is thus the paradigm for the possible and our notion of possibility generally, as well as our intuitions concerning what particular things are possible, will be based on judgments of “family resemblance” to the paradigm cases. This will, of course, leave many controversial cases requiring further analysis and perhaps even some recalcitrant borderline cases, but no more, I think, than the standard analysis. Further, there are still important questions to be taken up – such as the extent to which we apprehend actuality and the method of proceeding from paradigm to derivative cases. These questions are vitally important, but too large to take up here.[[17]](#footnote-17) Instead, let me proceed with a sketch of the proposal. In the next section, I will approach this matter from a different direction.

Since the actual world is a possible world, whatever exists (i.e. is real or actual) in the actual world is *eo ipso* logically possible. Any such entity will also be materially and existentially possible as well by that same fact, since the fact that something actually exists entails both that it can exist and that whatever conditions are requisite for its existing have actually obtained. In the same way, whatever exists in any world, whether actual or non-actual, will be such as to have the necessary and sufficient conditions for its existence obtain in that world and will thus be materially possible in that world as well. However, it does not follow that whatever is logically possible is materially so in every world. Some things, while perhaps capable of existence in some possible world, are not capable of existence in the actual world, because they are (e.g.) physically impossible considered in relation to the laws of nature that hold in the actual world. By the same token, the laws of nature in other possible worlds may exclude the physical possibility of entities that exist in the actual world. Such entities will be materially possible in the actual world but not in those worlds.

Similarly, some things are materially impossible, such that their actual existence is excluded by their very nature. Among these things will be formally impossible entities, whose existence is impossible on purely logical or conceptual grounds; such entities will be logically impossible as well. Since things of this sort are necessarily non-existent (i.e. exist in no possible world) such beings will also be existentially impossible, i.e. non-existent as a matter of fact in the actual world. Because of this, as we saw above, we can successfully infer, as we routinely do, from the logical impossibility of any kind of thing, event or state-of-affairs to its actual non-existence. Thus, it is false that “conceptual” truths apprehended *a priori* cannot possess existential import in/for the actual world. (*Contra* Hume and Kant, not all conceptual truths are *merely* conceptual, i.e. about the way we use words or about relations between ideas.) Thus, whatever is logically impossible is materially impossible and whatever is materially impossible is existentially impossible as well.

**Material and Real Possibility** In the last section, I mentioned the notion of real possibility, i.e. possibility in the actual world as this attaches actual entities (things, events, and states-of-affairs) in that world considered just as real. I also said that the notion of material possibility captures that of real possibility. However, they are not the same notion. Material possibility, as I conceive of it, is a more general notion encompassing logical possibility as a special case. It is, essentially, possibility relative to a set of specifiable antecedent conditions regardless of whether these conditions are or can be exemplified in the actual world. While the actual world and what is possible relative to the conditions obtaining there is our paradigm for, and primary source of insight into, what is possible in other, non-actual possible worlds, the notion of material possibility just as such is not limited to the actual world. We can thus speak about what is materially possible in a given possible world, regardless of whether that world is the actual world or not. Thus, while logical possibility in modal logic concerns the modal properties of propositions across possible worlds, material possibility concerns discrete possibilities within specific and specified possible worlds relative to the conditions obtaining there at a given time. Thus, though its scope extends beyond the actual world, being applicable *in* all possible worlds, it is not itself a logical modality – it is not a status attaching to things *across* possible worlds. For example, it does not follow that if something is materially possible in any world, that it is materially possible in every world; whether that is the case will depend on the conditions obtaining in that world.

For its part, real possibility concerns what is possible in the actual world as *a matter of fact* relative to the conditions obtaining at a particular *actual* time in that world. Whatever is really possible is therefore also materially possible; all that is lacking at T is the presence of an appropriate proximate cause capable of actualizing that real possibility in those circumstances. However, the converse does not hold; something can be materially possible without being really possible at some specific time. For example, my being born a woman is no longer really possible even though state-of-affairs is both physically possible considered in itself and was even such as to be really possible at some time in the past. Such a scenario is and remains logically and materially possible even though no longer physically or really so, due to an irrevocable change of circumstances that physically excludes its actuality at any point in the future. Thus, despite the fact that logical and real possibilities are species of material possibility, material possibility is intermediate between them, having a smaller extension in the actual world than the first (since some things are logically possible in actual world that are not materially so) and a larger extension than the second in that world (since some things are materially possible in the actual world that are no longer really possible in that world.) In the same way, real possibilities are limited to the actual world, material possibilities relative to individual worlds, and logical possibilities possessed of modal properties that hold across possible worlds.

Where real possibilities are concerned, traditional Aristotelian act/potency analysis holds true. Real possibility presupposes the existence of an actual world of things, events, and states-of-affairs and thus of things, events, and states-of-affairs that are actualized, realized, and (in Leibniz’s sense) *determinate*, so that at any point in time a definitive answer can be given to the question whether that thing (etc.) has or lacks any particular attribute. Among the attributes that things (etc.) have or lack in virtue of their current state of actuality or realization are potentialities for further gain or loss of attributes, i.e. *potentialities for* *change*. These potentialities inherent in things, when conceived of as objects of future realization, are *real possibilities for change*. All such possibilities will also be materially possible in the sense defined above.

 Although both logical possibility and real possibility are, on the view offered here, species of material possibility, they nevertheless differ in a number of important ways. First, logical possibilities are abstract, intentional entities that considered in themselves belong to the same sort of sempiternal realm to which numbers, propositions, plane figures, and other abstract objects belong. By contrast, real possibilities belong to the actual world and thus are concrete as potentialities in and for concrete entities that already exist as real or actual and are engaged in a process of change/becoming. Secondly, real possibilities must be concretely specified relative to actual, occurrent moments of time, whereas logical possibilities, even if time-indexed, are essentially tenseless. Thirdly and most importantly, since real possibilities are potentialities relative to conditions obtaining at an occurrent moment of time, the modal status of such possibilities can change, whereas the modal status of logical possibilities are essential to them and invariant across possible worlds. Since real possibilities are grounded in concrete circumstances and states-of-affairs that are subject to change in the actual world, what is really possible at one moment may no longer be so at another. Thus, it was really possible at one point in time that I might have had a twin brother. However, that point in time passed without that potentiality being realized, so that it is no longer possible that I have a twin brother. The modal status of that possibility changed from being really possible to being no longer really possible due to changes in circumstances that eliminated the necessary conditions for that possibility considered as a potentiality for change in that situation. For this reason, there are no real possibilities with regard to the past; real possibilities exist only in the present and are such for the future only insofar as the future can be affected from the present.

**Real and Physical Possibility** The notion of physical possibility is related to that of real possibility, inasmuch as something is physically possible if it is really possible relative to the laws of nature that hold in the actual world. On the assumption that there are such laws, grounded in the natures of the most basic entities existing in the actual world, and that such laws are in fact universal and exceptionless, some states-of-affairs that are apparently coherently conceivable without contradiction are not really possible after all. Thus, I cannot flap my arms and fly to the moon, jump over the Space Needle like Superman, or swim the Atlantic Ocean in five minutes, although there is no apparent contradiction in any of these states-of-affairs considered just as such. Nevertheless, given the physical laws that govern the actual universe, each of these is physically impossible and thus really impossible as well in the actual world. Given the laws of nature, there is no set of conditions in the actual world as physically constituted that can bring about any of these situations. In the same way, neither are any of these physically possible states-of-affairs materially possible in the actual world, since material possibility is precisely possibility relative to a set of specifiable conditions in a world at a time, and in the actual world no such conditions can obtain at any time, being excluded by the laws of nature.

It does not follow, of course, that these states-of-affairs are materially impossible or logically impossible *tout court*. So far as we know, the laws of nature that obtain in the actual world are contingent and could have been otherwise. Since it is epistemically possible that there be other laws of nature besides those that obtain in the actual world, laws that would permit such states-of-affairs to obtain, there are other possible worlds in which such states-of-affairs would not be excluded by those laws, and thus there would be some specifiable set of conditions capable of bringing them about in those worlds. As such, if one of those worlds had been the actual world in preference to the one that is, those states-of-affairs would be materially possible in those worlds and thus logically possible as well, since it is sufficient for the latter that a thing, event, or state-of-affairs be materially possible in any world.

 In the notion of physical impossibility, we envisage a set of contingent yet perfectly general conditions within a world that exclude the existence, occurrence, or obtaining of logically possible things, events, and states-of-affairs in that world, and thus their real possibility in that world. By contrast, a state-of-affairs is physically possible just in case there is some specifiable set of conditions consistent with the laws of nature that, were they to obtain at some particular time, would bring about that state-of-affairs at that time or at a subsequent time. In that case, the physically possible and the materially possible are once again extensionally equivalent in a way that material impossibility and physical impossibility are not. Even so, physical impossibility is a stronger notion than that of material impossibility. The notion of real possibility is stronger still, so much so that it lacks all generality and is applicable only in specific contexts. Beyond the notion of the physically possible, we can ask what is possible relative to a set of conditions obtaining at a time only in terms of those conditions and the potentialities the things, events, or states-of-affairs existing, occurring, or obtaining at that time possess as a consequence of those conditions and the manner in which they can be changed or altered at that time in order to realize or actualize those potentialities. To raise this question, however, is to introduce the notion of causation and the notion of causal possibility as well.

**Real and Causal Possibility** Real possibility, as I have just finished stating, is particular rather than general. There is nothing that is really possible in itself or *tout court*. Things, events, and states-of-affairs are *really* possible only relative to a specific set of circumstances actually obtaining in the actual world at a specific time and constitute what, following Aristotle, we might call a second potency of whatever it is to which that real possibility is ascribed. Such potentialities are not merely inchoate or such as to characterize a thing’s nature generally; instead, they are already semi-actualized, available for, and ready to be fully expressed in that situation. In that situation, it awaits only the introduction of an appropriate additional condition that acts as the stimulus, catalyst, or agent of in order for that potentiality to be fully realized. This is what, in ordinary parlance, we refer to as a cause or, more technically, as an efficient cause.

 There is not space here to discuss the full analysis of the notion of cause, which I hope to attempt elsewhere. Instead, I want here to focus on the efficient cause acting as what is referred to in the law as the *proximate* cause, the immediately relevant antecedent condition to which we can assign primary responsibility for bringing about some significant change in the real world. A proximate cause in this sense will be different from a background or standing condition on the one hand and an indirect or merely contributory cause on the other. Intuitively, it is the cause *but for the sake of which not*, i.e. that which, if it had not occurred, the dreadful consequence would not have followed, but not this alone. It also has to be the direct physical cause of the dreadful consequence or the condition that initiates and makes that consequence physically inevitable. Both an insult and a stabbing may count as the cause of a man’s death, in the sense of being the cause “but for the sake of which not” in a particular situation, but only the stabbing is the proximate cause of death. Of course, the consequence is not always dreadful and is often benign, though not, of course, in this case. For our purposes here, this rough-and-ready account will have to do.

Real possibility concerns potentialities at actual moments of time and cannot be generalized. Nevertheless, unless we categorize actual moments of time under generalizations, there will be no way for us to know what is really possible at that given moment or to exploit those potentialities to our advantage. As such, the notion of real possibility needs to be supplemented with the notion of causal possibility as a means of identifying and exploiting potentialities at particular times. In this case, possibility becomes related to time in yet another way, one that involves succession in accordance with a rule. We first arrive at a belief in causal connections based on the observation of regularities that support successful habits of inference and give us input into the shape of the future that allows us to manipulate it. This results in rough-and-ready generalizations that subsequent theoretical inquiry replaces, over time, with scientific laws. At the same time, however, these laws are grounded and their applicability explained by reference to causal mechanisms that, while describable in general terms, are nevertheless realized in each specific instantiation of the things, events, and states-of-affairs that fall under each general law and thus *really* possible in that situation at that time. As to the details of such mechanisms, we must leave this to natural science to discover. Our concern here is to consider what, in general, causal modality amounts to.

I propose the following analysis as a starting point: Where S refers to the set of standing conditions in virtue of which some event X is really possible at T,

X is *causally possible* at T if (a) X is really possible at T and (b) there is a causal path

from S at T to X at some subsequent moment T+n.

X is *causally impossible* at T if there is no causal path from S at T to X at any subsequent

 time.

X is *causally necessary* at T if (a) X is causally possible at T and (b) not-X is causally

impossible at T.

X is *causally contingent* at T if both X and not-X are causally possible at T.

A causal path is a way in which X (some specific thing, event, or state-of-affairs) can be brought into existence and will be constituted by a causal mechanism or set of such mechanisms capable of giving rise to X the operation of which is describable by reference to a law or set of such laws. For the most part, what is causally possible will quite naturally coincide with what is physically possible and, in the actual world, physical possibility will always plays some role in causal possibility. The exercise of free agency, which is not law-governed, raises some further complications; however, I shall ignore those here and concentrate on causal possibilities as such.

 In this analysis, causal possibilities are real possibilities, i.e. potentialities relative to a set of standing conditions that actually exist, occur, or obtain at a particular time. Causal possibilities are thus conceived of as potentialities grounded in prior actualities constituting a set of standing conditions that exist, occur, or obtain at T. At the same time, whatever is causally impossible will be really impossible as well. The causal possibility of a thing, event, or state-of-affairs crucially depends on whether there is a causal path from S to T at X; where there is no such path, there is no potentiality at T for the production of X at some subsequent time T+n. In that case, X is not really possible at T. Causal generalizations and subsequent causal laws will simply be those real possibilities abstracted from specific situations and times. Such generalizations will come into play when, noticing that in a specific situation at a specific time, certain standing conditions obtain and that the introduction of a relevant proximate cause will produce a particular effect, that the existence, occurrence, or obtaining of that effect

 In the same way, causal necessity requires the causal possibility of X at T combined with the causal impossibility of its non-occurrence at T. This latter means that, given S, the existence, occurrence, or obtaining of X at T+n is unpreventable at T, such that all competing, causally possible outcomes at times previous to T have been cancelled or superseded and the causal path to X at T+n no longer capable of being interfered with or prevented from giving rise to X as its outcome. Causal necessity in this sense is frequently observed in relation to our limited ability to control natural outcomes, at least after a certain point along the causal path from S to X. If some doctrine such as mechanistic determinism were true, then from that perspective every event and state-of-affairs would be causally inevitable and thus causally necessary in that sense. However, for reasons I have given elsewhere, I don’t think that there are any such thing as causal necessity in that sense and at any rate this is not what causal necessity usually refers to in the philosophical literature. Let me now turn to this philosophical conception of causal necessity.

**Causal Necessity and Counterfactuals** It is a philosophical commonplace that any account of causal necessity must support counterfactuals. If it is the case that water boils at 212 degrees Fahrenheit, then it is the case that, if the water in this pot had been heated to that temperature at some particular time T, then it would have boiled at some subsequent time T+n, even though it was not heated and did not boil at that time. This conviction expresses the weaker, but more common notion of causal necessity as a kind of material necessity that is not so much about the truth-values of propositions but rather about productive relations between things, events, and states-of-affairs in the actual world. If change is the realization or actualization of a potency rooted in the nature of the thing, and if efficient causation is the realization or actualization of that potency through the exercise of an external agency, then we can account for it by reference to the natures of the things we identify as cause and effect. Given the natures of those things as actualized, and the dispositional properties they possess in virtue of those natures, we are able to specify what the potentialities for each (i.e., their capacities and powers) are at a specific time based on prior observation and experiment. On the basis of further observation and experiment, we are able identify the results of their mutual interaction and influence. However, since these capacities and powers are rooted in the natures of the things, they are present in every relevantly similar set of circumstances. Thus, given the nature of water and its chemical structure, we are able to discover that when the molecules in a volume of water achieve a certain level of motion that this is sufficient to break the surface tension of the liquid and allow those molecules to escape into the air, something we observe as boiling and the production of steam. On the assumption that all volumes of water are of the same basic nature, we can anticipate that every volume of water will act in the same way (*mutatis mutandis*) in the presence of sufficient heat. We have discovered that the application of an external source of heat raises the molecular motion of the molecules in a volume of water, with a predictable effect when that volume of water is raised to 212 degrees Fahrenheit. We therefore have good reasons to suppose that, if sufficient heat had been applied to this particular volume of water to that degree at some arbitrarily chosen time, it too would have boiled. The law expressing this conviction, rooted in this analysis, possesses material necessity only as a shorthand account for a more complex explanation involving the natures of things, their dispositional properties (existing in second potency) and results of their interactions with one another. On this account, laws are casually necessary without their possessing any mystical causal power of their own.

 To assert a counterfactual is to state that, at some chosen time T, X was causally possible at some subsequent time T+n in virtue of the standing conditions actually obtaining at T, such that the introduction of a proximate cause or catalyst into the situation at T would have brought about the existence, occurrence, or obtaining of some thing, event, or state-of-affairs. Such a claim can be true even if the antecedent is false (i.e. the conditions it describes did not, in fact, obtain at T) just so long as it is materially possible that they obtained at T and that if an appropriate proximate cause or catalyst had been introduced into those circumstances, then the consequent would have been true about the actual world.

This account differs from the standard analysis represented by the traditional Philonian conditional. According to this analysis, every conditional with a false antecedent is automatically true. While this does capture all true conditional statements with false antecedents, it notoriously does not exclude all the intuitively false ones. For example, the conditional “If it’s below 32 degrees Fahrenheit outside, then the puddles are freezing” is true regardless of whether the antecedent is true or false. However, the statement “If the kettle on my stove had been heated at 10 AM this morning, it would have boiled” is certainly false if there was no kettle on the stove at 10 AM or if it had been empty, in which case it would not have boiled but burned. Although the Philonian conditional is adequate for the purposes of formal logic, where it is only the validity of arguments that falls within the province of logic to determine, it will not do for a material logic applicable to the real world. The foregoing account is a useful supplement that guides us in making real-world causal inferences and explains why the aforementioned conditional is materially false even if considered true for formal purposes. In the cases where the conditional remains true even if the antecedent is false, the thing, event, or state-of-affairs referred to in the consequent is nevertheless causally possible given the truth of the antecedent, something that holds even if the antecedent is in fact false. In cases where conditionals with false antecedents are materially false, the antecedent (at least as stated) does not make the consequent materially necessary because it can be true without making that consequent true. This, in turn, is due to the fact that the antecedent (at least as stated) does not comprehend all of the conditions necessary and sufficient for the existence of the thing, the production of the event, or the bringing about of the state-of-affairs referred to in the consequent. A similar account can be given of the other supposed counterexamples to the Philonian conditional considered as a principle of material, and not just merely formal, logic.

**Summary**

An entity is **actual** if it exists, occurs, or obtains in the actual world at T (the present moment).

An entity is **existentially** possible if there are stateable necessary and sufficient conditions for its existence, occurrence, or obtaining at some moment T in some world W.

An entity is **really** possible if, given the conditions that obtain at the present moment T, it is capable of existing, occurring or obtaining in the actual world at some subsequent moment T+n.

An entity is **physically** possible if its existence, occurrence or obtaining at some time T in some world W is not excluded by the laws of nature that hold in that world.

An entity is **causally** possible if, given the conditions obtaining at some moment T, there is a causal path leading to the actual existence of that entity at some subsequent moment T+n.

An entity is **materially** possible if there is some specifiable set of conditions such that, if they obtained at some moment T in some world W, would be necessary and sufficient for the existence, occurrence, or obtaining of that entity in that world at T.

An entity is **logically** possible if it is materially possible in any possible world.

An entity is **epistemically** possible if its existence, occurrence, or obtaining at some moment T is not ruled out by anything that we know at the present moment T.

An entity is **formally** possible if it is conceivable without contradiction in the conception, i.e. is coherently imaginable. (We have no direct criterion for this – the closest we can attain is apparent coherent conceivability.)

1. See, for example, *The Material Logic of John of St. Thomas*, Yves Simon, trans., Chicago, Il., University of Chicago Press, 1955. John, a contemporary of Descartes, wrote this treatise around 1631-32. [↑](#footnote-ref-1)
2. See my *Physicalism and Scientific Realism*, unpublished. [↑](#footnote-ref-2)
3. See my papers “Kant’s Pre-Critical Proof for God’s Existence” and “Kant’s Critique of the Ontological Argument: FAIL” also on this website. [↑](#footnote-ref-3)
4. As argued in Alvin Plantinga’s famous papers, “*De Re* and *De Dicto*” and “World and Essence” in R.C. Sleigh, ed., *Necessary Truth*, Englewood Cliffs, NJ, Prentice-Hall, 1972, 152-199. [↑](#footnote-ref-4)
5. In *The Proof of the External World* (London, James Clarke, 2008), I distinguish between *intrinsic* and *extrinsic* epistemic possibility; the former concerns a lack of apparent contradiction in the meaning-content of a conception considered in itself, whereas the latter concerns what is conceivable without contradiction given the totality of one’s knowledge at a given time. [↑](#footnote-ref-5)
6. See Norman Malcolm, “Descartes’s Proof that his Essence is Thinking,” in Willis Doney, ed., *Descartes*, Garden City, NY, Doubleday Anchor Books, 1967, 312-37 and many others, down to the present day – this is now a commonplace in introductory philosophy texts that discuss Descartes or Substance Dualism. However, I believe that Descartes’ insight here can be vindicated by a more sophisticated argument containing it as one of its elements. [↑](#footnote-ref-6)
7. Berkeley, *Principles of Human Knowledge*, section 24. [↑](#footnote-ref-7)
8. As is argued in Virgil Aldrich, “Image Mongering and Image Management,” *Philosophy and Phenomenological Research*, Vol. 23, No. 1, 1962. [↑](#footnote-ref-8)
9. Also known as *The Only Possible Basis for a Demonstration of Existence of God*, Gordon Treash, trans, Lincoln, NB, University of Nebraska Press, 1979. [↑](#footnote-ref-9)
10. See the *Beweisgrund,* op. cit., 67 and 69. [↑](#footnote-ref-10)
11. This will nevertheless be an essential property of whatever is (e.g.) logically possible and so a *criterion* for it, even if not analytically primitive. [↑](#footnote-ref-11)
12. See the account in William and Mary Kneale, *The Development of Logic*, Oxford, Clarendon Press, 1975, 81-96. [↑](#footnote-ref-12)
13. Immanuel Kant, *The Critique of Pure Reason*, Norman Kemp Smith, trans., New York, MacMillan, 1929, 109-110. [↑](#footnote-ref-13)
14. Kant, First Critique, op. cit. 185. Kant later interprets these *schemata* in relation to objects as objects of possible experience, 251-252 rather than as what I have been calling things. [↑](#footnote-ref-14)
15. Despite his continued allegiance to this account of possibility, this is a point that Kant has forgotten by the time he arrives at his critique of the ontological argument. [↑](#footnote-ref-15)
16. Something like this is argued in Fabrizio Mondadori and Adam Morton, “Modal Realism: The Poisoned Pawn,” Michael J. Loux, ed., *The Possible and the Actual*, Ithaca, NY, Cornell University Press, 1976, 235-52. [↑](#footnote-ref-16)
17. However, I have discussed them elsewhere – see *The Proof of the External World*, Eugene, OR, Wipf and Stock, 2008. [↑](#footnote-ref-17)