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Necessity (or Contingency)

Physical necessity is the ancient idea that everything that has ever happened and ever will happen is necessary, and can not be otherwise. It is also known as actualism. The only thing that can possibly happen is what actually happens.

Necessity is often opposed to chance and contingency. In a necessary world there is no chance. Everything that happens is necessitated, determined by the laws of nature. There is only one possible (necessary?) future.

The great atomist Leucippus stated the first dogma of determinism, an absolute necessity.

> "Nothing occurs at random, but everything for a reason and by necessity."

Contingency is the idea that many things or events are neither necessary nor impossible. Possibility is normally understood to include necessity. If something is necessary, it is *a fortiori* possible. Contingency must be defined as the subset of possibility that excludes necessity.

Information philosophy claims that there is no physical necessity. The world is irreducibly contingent. Necessity is a logical concept, an idea that is an important part of a formal logical or mathematical system that is a human invention.

Like certainty, analyticity, and the *a priori*, necessity and necessary truths are useful concepts for logicians and mathematicians, but not for a metaphysicist exploring the fundamental nature of reality, which includes irreducible contingency.

The Logical Necessity of the Analytic and the *A Priori*

Consider the simple analytically true proposition, "A is A." Or perhaps the logical and mathematical statement that "1 = 1."

Most philosophers cannot imagine denying these true statements. But information philosophy now puts them in the correct historical perspective of new information creation and human knowledge acquisition. Both these facts became known long

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before humans developed the logical and mathematical apparatus needed to declare them *a priori* and analytic.

Willard Van Orman Quine's claim that all knowledge is synthetic is correct from this perspective. And since nothing in the world was pre-determined to happen, the acquisition of this knowledge was ultimately *contingent*.

We may consider some knowledge to be *synthetic a priori* (Immanuel Kant) or *necessary a posteriori* (Saul Kripke) if we find such descriptions useful, but neither is metaphysically true.

Of course truth itself is another human invention. So we should probably say metaphysically valid, where validity is defined as a procedure within our axiomatic metaphysical apparatus.

Information metaphysics begins by establishing the meaning of intrinsic information identicals, so we can provide an axiomatic ground for "A is A" and "1 = 1," which are usually considered fundamental laws of thought.[1]

The Logical Necessity of Necessity

Gottfried Leibniz gave us perhaps the best definition of logical necessity in his discussion of necessary and contingent truths. Beyond the *a priori* and analytic, this is metaphysical necessity.

> "An affirmative truth is one whose predicate is in the subject; and so in every true affirmative proposition, necessary or contingent, universal or particular, the notion of the predicate is in some way contained in the notion of the subject
>
> An absolutely necessary proposition is one which can be resolved into identical propositions, or, whose opposite implies a contradiction... This type of necessity, therefore, I call metaphysical or geometrical. That which lacks such necessity I call contingent, but that which implies a contradiction, or whose opposite is necessary, is called impossible. The rest are called possible.
>
> In the case of a contingent truth, even though the predicate is really in the subject, yet one never arrives at a demonstration or an identity, even though the resolution of each term is continued indefinitely..." [2]

1   See chapter 13 on Identity
2   Leibniz. 'Necessary and contingent truths' *Leibniz: Philosophical Writings* (1973).

First, we should note that Leibniz's definitions refer to propositions and predicates. In this respect, he is the original logical and analytic language philosopher. He shared the dream of Bertrand Russell, Ludwig Wittgenstein, and Rudolf Carnap, that all our knowledge of the world could be represented in propositions, or "logical atoms," as Russell and Wittgenstein called them, "atomic sentences" written in symbolic logic

Secondly, Leibniz's truths are always tautological, as Wittgenstein emphasized. They are of the form, "A is A," propositions "which can be resolved into identical propositions." Their truth ultimately lies in the identity of the subject with the predicate.

Note that Leibniz's "absolutely necessary" compares to modern modal logic axioms that define not only necessity, but the necessity of necessity, like the axiom that extends the model system M to become C.I. Lewis's S4, necessarily A implies necessarily necessarily A!

$$\Box A \supset \Box \Box \ A$$

The analytic philosopher Arthur Pap gave a clear account of the "necessity of necessity" argument in 1958. He asked the fundamental question "Are Necessary Propositions Necessarily Necessary?" Any contingency of truth must be denied. Necessary truths are independent of the physical world, outside space and time.

> "The question whether "it is necessary that p" is, if true, itself a necessary proposition is of fundamental importance for the problem of explicating the concept of necessary truth, since it is likely that any philosopher who answers it affirmatively will adopt the necessity of the necessity of p as a criterion of adequacy for proposed explications of necessary truth. He will, in other words, reject any explication which entails the contingency of such modal propositions as failing to explicate the explicandum he has in mind. The same holds, of course, for the concept of logical truth: since all logical truths are necessary truths (whether or not the converse of this proposition be true also), any criterion of adequacy for explications of "necessary truth" is at the same time a criterion of adequacy for explications of "logical truth." This question cannot be decided by formal reasoning within an uninterpreted system

of modal logic, containing the usual explicit definition of "necessary" in terms of "possible": p is necessary = not-p is not possible. Indeed, an uninterpreted system of modal logic can be constructed without even raising the question of the necessity of the necessity of p; thus there is no postulate or theorem in Lewis' system S2 that bears on the question, nor is the question informally discussed in the metalanguage. In Appendix II to Lewis and Langford's Symbolic Logic (New York and London, 1932) it is pointed out that Lewis' system of strict implication "leaves undetermined certain properties of the modal functions, ◊ p, ~ ◊ p, ◊ ~ p, and ~ ◊ ~ p." Accordingly "Np hook NNp," as well as "Np ⊃ NNp" (N . . . = it is necessary that . . .). is both independent of and consistent with the axioms of the system, and whether an axiom of modal iteration, e.g. "what is possibly possible, is possible" (which can be shown to be equivalent to "what is necessary, is necessarily necessary") should be adopted must be decided by extrasystematic considerations based on interpretation of the modal functions. Now, let us refer to the thesis that necessary propositions are necessarily necessary henceforth as the "NN thesis." What appears to be the strongest argument in favor of the NN thesis is based on the semantic assumption that "necessary" as predicated of propositions is a time-independent predicate, where a "time-independent" predicate is defined as a predicate P such that sentences of the form "x is P at time t" are meaningless.[3]

In the latest systems of modal logic (S5 and K), there are reduction theorems that show *iterated* modalities of any degree (NN, NNN, NNNN, etc.) can be reduced to first degree.[4] So we can point out that all such additions of "necessarily" add no strength to an analytical statement that is tautologically true. Nor do additions of "is true," "in all possible worlds," etc. add anything.

As David Wiggins, a champion of identity said clearly, "Calling the identity necessary adds nothing more than "is true" or "necessarily true in all possible worlds."

3   Pap (1958) 'The Linguistic Theory of Logical Necessity,' *Semantics and Necessary Truth*, p.120

4   Hughes and Cresswell (1996), *New Introduction to Modal Logic*, p. 98

Consider P, the proposition that A = A. A is A, A is identical to A, etc.

We can assert P.

Do any of these *iterated modality* statements add anything?

It is true that P.

It is necessarily true that P.

P is true in all possible worlds.

P is necessarily true in all possible worlds.

The Necessity of Identity

In the physical and the logical worlds, no entity can fail to be identical to itself. *The only strict identity is self-identity*. So we can speak loosely of the necessity of identity. But is this a tautology, empty of meaning, like A = A?

In recent years, modal logicians claim to prove the "necessity of identity" using the converse of Leibniz's Law – the "Identity of Indiscernibles." [5]

What WILLARD VAN ORMAN QUINE called the indiscernibility of identicals claims that if x = y, then x and y must share all their properties, otherwise there would be a discernible difference. Now one of the properties of x is that x = x, so if y shares that property "= x" of x, we can say y = x. Necessarily, x = y. QED.

Our rule that the only identity is self-identity becomes in information philosophy that two distinct things, x and y, cannot be identical because there is some difference in information between them. Instead of claiming that y has x's property of being identical to x, we can say only that y has x's property of being self-identical, thus y = y..

The necessity of identity in symbolic logic is

(x)(y) (x=y) ⊃ □ (x=y)

Despite many such arguments in the philosophical literature over the past forty or fifty years, this is a flawed argument. Numerically distinct objects can only be identical "in some respect," if they share qualities which we can selectively "pick out". We can say that a red house and a blue house are identical *qua* house. But they are quite different *qua* color.

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5   See chapter 13.

Here is Saul Kripke's argument against the possibility of *contingent* identity statements:

> First, the law of the substitutivity of identity says that, for any objects x and y, if x is identical to y, then if x has a certain property F, so does y:
>
> (1) $(x)(y) [(x = y) \supset (Fx \supset Fy)]$
>
> [Note that Kripke omits the critically important universal quantifier (F), "for all F."]
>
> On the other hand, every object surely is necessarily self-identical:
>
> (2) $(x) \square(x = x)$
>
> But
>
> (3) $(x)(y) (x = y) \supset [\square(x = x) \supset \square (x = y)]$
>
> is a substitution instance of (1), the substitutivity law. From (2) and (3), we can conclude that, for every x and y, if x equals y, then, it is necessary that x equals y:
>
> (4) $(x)(y) ((x = y) \supset \square(x=y))$
>
> This is because the clause $\square(x = x)$ of the conditional drops out because it is known to be true.
>
> This is an argument which has been stated many times in recent philosophy. Its conclusion, however, has often been regarded as highly paradoxical. For example, David Wiggins, in his paper, "Identity-Statements," says,
>
> Now there undoubtedly exist contingent identity statements. Let a = b be one of them. From its simple truth and (5) [= (4) above] we can derive '$\square$ {a = b}'. But how then can there be any contingent identity statements? [6]

Where are Kripke's errors? We must unpack his "indiscernibility of identicals." Instead of $(x)(y) [(x = y) \supset (Fx \supset Fy)]$, we must say that we can clearly discern differences between x and y, their names and their numerical distinctness, unless we are merely talking about a single object using two different names. For example, Hesperus = Phosphorus *qua* names referring to the planet Venus.

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6   Kripke (1971) 'Identity and Necessity,' in Munitz, M., *Identity and Individuation*. p. 136

Separating Necessity from Analyticity and A Prioricity

Kripke is well known both for his "metaphysical necessity" and the "necessary *a posteriori*."

Broadly speaking, modern philosophy has been a search for truth, for *a priori,* analytic, certain, necessary, and provable truth. For many philosophers, *a priori*, analytic, and necessary, have been more or less synonymous.

But all these concepts are mere ideas, invented by humans, some aspects of which have been discovered to be independent of the minds that invented them, notably formal logic and mathematics. Logic and mathematics are systems of thought, inside which the concept of demonstrable (apodeictic) truth is useful, but with limits set by Kurt Gödel's incompleteness theorem. The truths of logic and mathematics appear to exist "outside of space and time." We call them *a priori* because their proofs are independent of experience, although they were initially abstracted empirically from concrete human experiences.

Analyticity is the idea that some statements, some propositions in the form of sentences, can be true by the definitions or meanings of the words in the sentences. This is correct, though limited by verbal difficulties such as Russell's paradox and numerous other puzzles and paradoxes. Analytic language philosophers claim to connect our words with objects, material things, and thereby tell us something about the world. Some modal logicians, inspired by Kripke, claim that words that are names of things are necessary *a posteriori*, "true in all possible worlds." But this is nonsense, because we invented all those words and worlds. They are mere ideas.

Perhaps the deepest of all these philosophical ideas is necessity. Information philosophy can now tell us that there is no such thing as absolute necessity. There is of course an adequate determinism in the macroscopic world that explains the appearance of deterministic laws of nature, of cause and effect, for example. This is because macroscopic objects consist of vast numbers of atoms and their individual random quantum events average out. But there is no metaphysical necessity. At the fundamental microscopic level of material reality, there is an irreducible contingency and indeterminacy.

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Everything that we know, everything we can say, is fundamentally empirical, based on factual evidence, the analysis of experiences that have been recorded in human minds.

As ALBERT EINSTEIN put it,

> "Pure logical thinking can give us no knowledge whatsoever of the world of experience; all knowledge about reality begins with experience and terminates in it." [7]

So information philosophy is not what we can logically know about the world, nor what we can analytically say about the world, nor what is necessarily the case in the world. There is nothing that is the case that is necessary and perfectly determined by logic, by language, or by the physical laws of nature. Our world and its future are open and contingent, with actualizable possibilities that are the source of human freedom.

For the most part, philosophers and scientists do not believe in possibilities, despite their invented "possible worlds," which are on inspection merely multiple "actual worlds." This is because they cannot accept the idea of ontological chance. They hope to show that the appearance of chance is the result of human ignorance, that chance is merely an epistemic phenomenon.

Now chance, like truth, is just another idea, just some more information. But what an idea! In a self-referential virtuous circle, it turns out that without the real possibilities that result from ontological chance, there can be no new information. Information philosophy offers cosmological and biological evidence for the creation of new information in the universe. So it follows that chance is real, fortunately something that we can keep under control. We are biological beings that have evolved, thanks to chance, from primitive single-cell communicating information structures to multi-cellular organisms whose defining aspect is the creation and communication of information.

The theory of communication of information is the foundation of our "information age." To understand how we know things is to understand how knowledge represents the material world of "information structures" in the mental world of immaterial ideas.

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7   Einstein (1933) 'On the Method of Theoretical Physics,' (The Herbert Spencer Lecture) *Philosophy of Science, Vol. 1, No. 2 (Apr., 1934), p. 165*

All knowledge starts with the recording of experiences in minds. The experiences of thinking, perceiving, knowing, feeling, desiring, deciding, and acting may be bracketed by philosophers as "mental" phenomena, but they are no less real than other "physical" phenomena. They are themselves physical phenomena.

They are just not material things.

Information philosophy defines human knowledge as immaterial information in a mind, or embodied in an external artifact that is an information structure (e.g., a book), part of the sum of all human knowledge. Information in the mind about something in the external world is a proper subset of the information in the external object. It is isomorphic to a small part of the total information in or about the object. The information in living things, artifacts, and especially machines, consists of much more than the material components and their arrangement (positions over time). It also consists of all the information processing (e.g., messaging) that goes on inside the thing as it realizes its entelechy or telos, its internal or external purpose.

All science begins with information gathered from experimental observations, which are mental phenomena. Observations are experiences recorded in minds. So all knowledge of the physical world rests on the mental. All scientific knowledge is information shared among the minds of a community of inquirers. As such, science is a collection of thoughts in thinkers, immaterial and mental, some might say funda*mental*. Recall Descartes' argument that the experience of thinking is that which for him is the most certain.

The Master Argument for the Actual World

Aristotle's logic defended the logical necessity that only one of two contradictory statements can be true, and the other false. Diodorus Cronus developed his Master Argument to show that only one answer to a question about a future event can be true. This led to the Megarian idea of actualism. There is no future contingency and only one possible future.

Diodorus' paradox was the result of the principle of bivalence or the law of the excluded middle. Only one of two logically

contradictory statements can be necessarily true. ARISTOTLE solved the paradox by saying that the truth of statements about the future is contingent on the actual future, as follows,

"A sea battle must either take place tomorrow or not,

but it is not necessary that it should take place tomorrow,

neither is it necessary that it should not take place,

yet it is necessary that it either should or should not

take place to-morrow." [8]

The major founder of Stoicism, CHRYSIPPUS, took the edge off strict necessity. Like DEMOCRITUS, Aristotle, and EPICURUS before him, Chrysippus wanted to strengthen the argument for moral responsibility, in particular defending it from Aristotle's and Epicurus's indeterminate chance causes. Whereas the past is unchangeable, Chrysippus argued that some future events that are possible do not occur by necessity from past external factors alone, but might depend on us. We have a choice to assent or not to assent to an action.

Later, Leibniz distinguished two forms of necessity, necessary necessity and contingent necessity. This basically distinguished logical necessity from physical (or empirical) necessity.

Necessity and Free Will

The eighteenth century debates about free will and determinism were called freedom and necessity. Deniers of free will were called "necessitarians."

Many thinkers distinguished a moral necessity from physical necessity. Moral necessity describes the will being (self-) determined by an agent's reasons and motives. Extreme libertarians insisted that the will cannot be "determined" by reasons, thinking this implies pre-determinism, which it does not.

In two-stage models of free will, chance or indeterminism in the generation of alternative possibilities for action breaks the causal chain of determinism. Actions are not directly determined by reasons or motives, but by an agent evaluating those possibilities in the light of reasons and motives.

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8   Aristotle. *De Interpretatione* IX, 19 a 30

The thinking agent generates new ideas and chooses to act on one of them. Thoughts are free. Actions are willed. Free and Will are two temporal stages in the process of free will.

Chance is regarded as inconsistent with logical determinism and with any limits on causal, physical or mechanical determinism.

Despite abundant evidence to the contrary, many philosophers deny that chance exists. If a single event is determined by chance, then indeterminism would be true, they say, and undermine the very possibility of certain knowledge. Some go to the extreme of saying that chance would make the state of the world totally independent of any earlier states, which is nonsense, but it shows how anxious they are about chance.

The core idea of determinism is closely related to the idea of causality. Indeterminism for some is simply an event without a cause. But we can have an adequate causality without the strict determinism that implies complete predictability of events and only one possible future.

An example of an event that is not strictly caused is one that depends on chance, like the flip of a coin. If the outcome is only probable, not certain, then the event can be said to have been caused by the coin flip, but the head or tails result was not predictable. So this causality, which recognizes prior events as causes, is undetermined and the result of chance alone.

Events are caused by a combination of caused and uncaused prior events, but not completely pre-determined by events earlier in the causal chain, which has been broken by the uncaused causes.

Despite DAVID HUME's critical attack on the logical necessity of causes, many philosophers embrace causality strongly. Some even connect it to the very possibility of logic and reason. And Hume himself strongly, if inconsistently, believed in necessity while denying causality. He said "'tis impossible to admit any medium betwixt chance and necessity." [9]

Even in a world with chance, macroscopic objects are determined to an extraordinary degree. This is the basis for an adequate physical causality.

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We call this kind of determinism (determined but not pre-determined) "adequate determinism." This determinism is adequate enough for us to predict eclipses for the next thousand years or more with extraordinary precision. Newton's laws of motion are deterministic enough to send men to the moon and back.

The presence of quantum uncertainty leads some philosophers to call the world undetermined. But indeterminism is misleading, with strong negative connotations, when most events are overwhelmingly "adequately determined." The neural system is robust enough to insure that mental decisions are reliably transmitted to our limbs. Our actions are determined by our thoughts and our choices. But our thoughts themselves are free. This simply means that our actions were not pre-determined from before we began thinking about our options.

No Logical Necessity in the Material World

We conclude with the metaphysical position that necessity is merely an idea. It is a valuable idea in the world of thought, in logic and in mathematics especially. But it does not bind events in the material world, which we find to be metaphysically contingent.

Many modern metaphysicians have become strong necessitarians. Symbolic logic and modal logic are powerful tools for reasoning. They are applicable to metaphysical questions about abstract entities and non-existent objects.

Necessitist philosophers deny the contingency of what there is, asserting the necessity of all that exists, perhaps allowing contingency of how things are arranged. This conforms to the idea that matter (with energy) are conserved quantities, where their information content is variable and growing. But the metaphysicians' insistence that the question of necessity versus contingency can only be settled by theoretical enquiry is mistaken.[10]

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10   Williamson (2013). *Modal Logic as Metaphysics*, chapter 1.

Necessitism

We can accept a necessitist analysis of some limited set of propositions. The leading proponent of necessitism is Timothy Williamson, who describes his work as follows.

> "Necessitism is the view that necessarily everything is necessarily something; contingentism is the negation of necessitism. The dispute between them is reminiscent of, but clearer than, the more familiar one between possibilism and actualism. A mapping often used to 'translate' actualist discourse into possibilist discourse is adapted to map every sentence of a first-order modal language to a sentence the contingentist (but not the necessitist) may regard as equivalent to it but which is neutral in the dispute. This mapping enables the necessitist to extract a 'cash value' from what the contingentist says." [11]

Modal logicians like Rudolf Carnap and Willard Van Orman Quine thought their work in logical positivism and logical empiricism had applications to the world. Quine's idea of "naturalizing epistemology" was an attempt to add the scientific method of experimental evidence to what was otherwise an "internalist" approach to the justification of knowledge.

As long as we limit necessitism to a select set of sentences in a language, we can accept the elimination of anything contingent in such a formal mathematical "model system."

But attempts to apply concepts from a model system, inside which everything has a necessary relationship to everything else, to the external world is fraught with danger.

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11   Williamson (2010) 'Necessitism, Contingentism and Plural Quantification,' *Mind*, 2010, 119, pp.657-748

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