

# **The Medium of Contingency**

An Inverse View of the Market

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# The End of Probability

## 1.1 The void of possibilities

The radically-emergent event is not part of a previous range of possibilities.<sup>1</sup> It produces its own causes or the very possibilities of which it could be later identified as a member.<sup>2</sup> An explanation or an *account* of the event – literally the count of possibilities of which the event is thought to be a ‘realization’ – is always given after the event, in what might be called a *backward narrative*.

For this reason, such events are neither ‘improbable’ nor ‘extremely improbable’. They are not even ‘impossible’ – what probability theory characterizes as events of measure 0. They are literally immeasurable. I call them *im-possible*, to emphasize the fact that they are external to the whole regime of possibility. There is no common measure by which the range of possibilities of which they will become members when they take place can be joined with the previous range. The future world that they bring about is radically incompatible with the present one. Hence we cannot, for any time present, conditionalize on their happening as if they were new evidence on which we could rely to update our probability measure. It is not a matter of updating probability but of updating the whole universe of possibilities. The new universe cannot be re-immersed in the old one as a part that used to receive zero measure or zero probability, because the two universes are literally incompatible with each other. They cannot form a union set.

The radically-emergent event (or the event, for short) takes place in a realm that precedes the construction of probability. Probability requires as preliminary that the set of possibilities be identified; and the set of possibilities, in turn, requires an established reality after which the possibilities are modeled. The possible doesn’t precede the real event or announce it, as the paradigm of prevision and, typically, probability theory want us to believe, but it is a fabrication made after the real has taken place, a reduplication of the existing real combined with a slight and unimaginative variation.<sup>3</sup> We mentally change a few selected items in the present real – what we call ‘states of affairs’ or ‘states of the world’ – and we trick ourselves into believing that those variations represent alternative possibilities that could have been equally realized, one of which, the present real, happened to become actual.

The real is an altogether different matter than the possible, without any possible communication or mediation between the two. What lies outside possibility or beyond the range of possibilities – literally, the im-possible, or the event – is real, because the procedure whereby we fabricate the possible out of the real is always incomplete and deficient and falls short of the real. What comes as a surprise to our imagined possibilities and shakes them completely is real. The radically-emergent event is real for this reason. It is not unpredictable because of its low probability but because it wasn't imaginable beforehand. It wasn't part of a list of possible states to which probability – high or low, it doesn't matter which – was assigned. Radical contingency, or the event, shakes the range of possibilities and updates a whole new world, which may be incompatible with the previous one. Historic events are history-changing.

After the event, the world is fundamentally different from before. To repeat, the new states of the world are not a subset of the existing set of possible states which initially received very low or even zero probability. The new states of the world are *incompatible* with the previous ones, in the sense that the set-theoretic union of the old and new ranges of states of the world makes no physical sense. A genuine Black Swan event (Taleb cites the example of 9/11) triggers a much more severe revision of our model of reality than a revision of probability.<sup>4</sup> It changes the whole universe of possibilities, obviously expanding it. Crucially, however, this expansion is not incremental and Bayesian theory is of no help. For instance, Taleb cannot reason counterfactually and call a 'hero' the congressman who would have passed the resolution, in another possible world on 10 September 2001, that cockpit doors should be bulletproof and should remain locked. The world following 9/11 is simply incompatible with the world that we knew before.

Possibilities are not just abstract elements that we may enjoy grouping anyway we like. Recognizing possibilities is the first step of *objectivation*; and for this reason it is constrained by its purpose. Our language and science, as models of reality, are such that we extract invariants from the flux of experience, and thus form the notion of an object and of its properties. In so doing, we start forming *expectations* about the object and its properties; for example, how the object might look if seen from another angle. We invent experimentation and therefore possibilities, for whoever speaks of expectations thinks of possibilities. Most importantly, we imagine counterfactuals: how an object would behave if, contrary to fact, it were subject to such and such experiment. As many philosophers of science and metaphysicians have observed, modalities and dispositional terms reside in language, not in reality.<sup>5</sup> This doesn't make them less objective, mind you, as it is precisely the construction of the object that we are talking about. However, they might not be real.

Reality is not necessarily coincident with objectivity. The most famous counterexample is quantum mechanics. Quantum reality is a patent refutation of the claim that nature has to conform to our objectivist language, or that realism is exhausted by objectivist realism. To experiment and measure in quantum mechanics, the sentient beings that we are have no choice but to set the stage of objectivation. Experiments have to be designed in such a way that the possible states of some observable will obtain with the known quantum probabilities. However, the irreversible steps that we take in setting up this procedure make it impossible concomitantly to measure a conjugate variable, or an observable whose range of possible states is incompatible with the present one. It is not as if

we were photographing an object from different angles. Because the ranges of possibilities are not conjoinable within a comprehensive range of possibilities, there is no subsistent object lying behind, of which it could be said that it would behave in such a way if a different experiment were conducted. The quantum violation of Bell's inequalities is independent of theory or formalism – it is perfectly real and empirical – yet, it challenges our ingrained view of the existence of an object, which is supposed to be subject to our gaze and experimentation. The notion of 'object' may, after all, just be theory; and we may have to recognize that objectivist reality is an invention.

Even so, there is definitely a mind-independent reality out there that quantum mechanics is addressing. There is something going on at the deeper level where it is not yet decided what observable shall be measured and what objective behavior (i.e. acquiring a certain state or exhibiting a certain property with a certain probability) shall be manifested. The formalism that deals with this reality in quantum mechanics is the wave function. Unsurprisingly, the wave function is a *meta-probabilistic predictive tool*; that is to say, it articulates whole ranges of possibilities that are incompatible with one another. A higher-level probabilistic logic has to deal with such incompatible contexts (or ranges of possibility). Typically, the ortho-algebras of quantum mechanics are one such. Kolmogorov probability and its measurable sets are only a sub-algebra of the quantum mechanical meta-probabilistic calculus.<sup>6</sup>

The case of quantum mechanics is a criticism of the notion of possibility and a proof of its limitation vis-à-vis reality. The existence of a level of reality in which we have to conceive of such a thing as incompatible ranges of possibilities is, to us, a pressing indication of the existence of a level of reality in which we may conceive of *no range of possibilities at all*. If probability is too local and parochial a notion to 'predict' reality in quantum mechanics, why should we insist that reality should be predicted by probability in other domains of reality, typically the event? Maybe prediction is no longer the adequate word, here.

The future doesn't consist of future possibilities. The future is real, when possibility, as we said, is only a fabrication made up *after* the real. The real future (as opposed to our toy-idea of a future) is made up of *events*, which emerge out of nothing that may anticipate them. Such events are real and create the possibilities that 'will have led' to them.

Reality always exceeds fiction. We encounter the real without previous warning. We are made aware of the event and of the world that this event brings about, and then go looking for a partition of that world into 'states of affairs' or 'states of the world'. This conceptualization of the real is only a model that is derived from the real itself. Only after the states of the world are identified do we call them possibilities and retroject them into the past so as to narrate a nice story about how the event might have come about, or about the possibilities that will have led to it. By extrapolation, we project those possibilities into the future and imagine that the future world will be no more than a *variation* of those identified possibilities.

Contingency is real. Even though the present world is actual and is no longer a 'possibility', it is definitely still contingent; that is, *it could have been otherwise*. The future world is no different in this regard. It is as real and contingent as the present world, except that it is not yet actual. Essentially, it too 'could have been otherwise', except that we don't actually know 'otherwise than what'. The

future world lacks the actual reference against which its contingency can be measured and therefore relativized. Precisely, the whole trick is to be able to perceive its contingency before distinguishing the different possibilities or even *identifying* its future state. Only in this way could the future be real.

The change of perspective we are calling for, here, is that we be able to appreciate the fact that the future world *can be different* before perceiving different *from what*. Because it is not yet actualized, it lacks the partition of states that would allow us to frame its difference as a variation of states. This contingency, which is not measured relatively to states, is called *absolute contingency*. The passage of time and our temporal recognition of possibilities are incidental on it.

The quantum mechanical wave function evolves deterministically in time according to Schrödinger's equation. This evolution is only a rescaling and nothing, no event, happens in the interval. On the plane of events, the time evolution of the wave function is thus reduced to null. For something to happen – an experiment, a measurement – an observable has to be selected completely contingently, by the experimenter, and only then something *objective* can be observed: a certain object (manifested now as particle now as wave) acquiring some property with some probability. The point is that the underlying reality (which is what the wave function stands for) is not objective; it is pre-objective.

One can be a realist in quantum mechanics (i.e. believe in this underlying reality), yet not ultimately believe in objects bearing stable and re-identifiable properties, or in objects that lend themselves to counterfactual reasoning. The point of the relative incompatibility of ranges of possibility is indicative, to my eyes, of a point of 'absolute incompatibility' of possibility. It says that reality, or absolute contingency, is categorically incompatible with possibility; that it is another category altogether.

To repeat: that reality should confront us, in quantum mechanics, with a background which is superior to possibility, in the sense that incompatible ranges of possibilities can be articulated against that background, is, to me, an indication that reality is always superior to possibility *in the cases that matter*; that is, in the case of the event or the case of absolute contingency. When it really *matters* and we are not merely strolling around within the perfectly charted permutations that some statistics has secured for us to play around with, we can only speak from a void of possibilities.

Now, the event of the experiment or the measurement, in quantum mechanics, was only punctual. Real time, as bearer of the event (not as the clock of deterministic evolution of the wave function), was thus reduced to a single point. My question: How *to move* that point, or rather drag it by force, along a line? How to *continue* the time of the one-time event; or again, how to turn the one-time event of quantum mechanics into a process? How to conceive of a process of continual updating of radically incompatible ranges of possibility? What higher-level probability can govern this process?

This unprocessable process is simply history and my claim is that the marketplace is one spot where we can stand and accompany history. The event is a case of rupture of the probabilistic clock; for this reason, it is outside time; it is a radical discontinuity. Yet, the demand is to find a place where this discontinuity can be continued: literally the place from which *to write* history (for lack of a better word).