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What's a chance event? Contrasting different senses of 'chance' with Aristotle's idea of meaningful unusual accidents

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Abstract: In this article, we present and explain ten different possible meanings of a chance event – some ontological, some epistemic – and provide examples whenever possible. We describe and illustrate more carefully the view of chance (*tyche*) expressed by Aristotle in his *Physics*, a demanding and complex notion, and critically contrast

it with the other senses examined, attempting to determine any (in)compatibilism.

Keywords: chance, Aristotle, *tyche*, *automaton.*

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1. Chance

Chance is one of those notions we are confronted with daily – we talk about it as having good or bad luck, or the result of the unexpected, or when we assign a probability for an event to occur, etc. However, the meaning of chance is far from clear; the notion has been defined several times over the last centuries and has become rather complex and ambiguous. In the case of history, for example, chance is sometimes used with reference to the view that historical events are not determined, are the result of accidents, have unknown causes, or are the outcome of free will. Given the multiplicity of senses for chance, any study of the chancy worldview needs to make clear what is meant by it.

In his introductory chapter to *Aristotle's Concept of Chance*, John Dudley (2011) compiles the main differing views on chance, including that of Aristotle, which he undertakes to investigate more fully. Also, Phil Dowe (2005) investigates different senses of chance and how they conflict with the notion of Divine Providence. In this article, we examine Dudley and Dowe's lists, propose complements and corrections, and provide examples. We expand the list by including Hegel's view of chance, and we reject one of the definitions Dudley presents (chance as related to the free will problem). Special attention will be given to Aristotle's view of chance – a more challenging and demanding notion, somewhat difficult to exemplify – that combines elements such as accidentally, expectation and purpose. We then contrast Aristotle's view with all other senses of chance to determine in which sense they can be said to be compatible or incompatible.

2. Different senses of chance

2.1 Chance as an empty notion

The first view of chance is mentioned by Aristotle:

> But chance and spontaneity are reckoned among causes (…) Some people even question whether they are real or not. They say that nothing happens by chance, but that everything (…) has some definite cause [and] it is always possible, (…) to find something which is the cause; but not chance, for if chance were real, it would seem strange indeed (*Ph.* II, iv, 195b31-37, 196a1-8).

Aristotle is expressing here the view (not his own) that all events are caused, and nothing can be caused by 'chance'. Hence, when we say an event was caused by 'chance' we are using a misleading notion, a term which has no content.

This is also the approach taken by Francis Bacon in his definition of the idols of *idola fori*:

> The idols imposed by words on the understanding are of two kinds. They are either names of things which do not exist, or they are names of things which exist, but yet confused and ill-defined (…) Of the former kind are Fortune [chance], the Prime Mover, Planetary Orbits, Element of Fire, and like fictions which owe their origin to false and idle theories (Novum Organum, I, lx).

Bacon advances an ontological thesis, i.e., belief in the causal principle: all events are caused – hence for him there is no such thing as chance. Of course, one might say that as a matter of custom we usually call chance events those of which no cause has been identified (yet) – but this is an epistemic claim, not the one Bacon is making here.

2.2 Chance as a psychological notion referring to surprise at the unexpected

The second definition of chance is presented by pre-Socratics such as Heraclitus, Empedocles, and Anaxagoras. According to these philosophers, chance refers to "the subjectively unexpected nature of certain necessary events" (Dudley, 2011, p. 3). Chance does not refer to the nature of occurrences, but to our subjective response to them: a chance event is one no one 'expected' to occur. In this sense, chance simply refers to being surprised by the unexpected.

No ontological or epistemic thesis is advanced here, and, unsurprisingly, there is nothing incoherent or inconsistent with the psychological approach. But it says nothing about chance as part of reality – precisely the question philosophers are concerned about.

2.3. Chance as a notion conveying our ignorance of the causes of an event

The third view of chance highlights the idea that the causes of chance events have an unpredictable nature. This is the view of Cicero (*Top*. xvii, 63), who holds that because nothing happens without a cause, *Fortune* (chance) is the effect of *hidden* or *obscure causes*. A similar remark has been made by Voltaire (*Le Philosophe Ignorant*, ch. xiii), who believes that because there is a cause for every occurrence, so chance is simply how we refer to events whose causes we are ignorant of.

Hume, in *An Enquiry Concerning Human Understanding*, expressed a similar view:

> Though there be no such thing as Chance in the world; our ignorance of the real cause of any event has the

> same influence on the understanding (…) (*Enquiry*, Part II, VI, i)[1]

> There are some causes, which are entirely uniform and constant in producing a particular effect; and no instance has ever yet been found of any failure or irregularity in their operation (…) But there are other causes, which have been found more irregular and uncertain (…) when any cause fails of producing its usual effect, philosophers ascribe not this to any irregularity in nature; but suppose, that some *secret causes* (…) have prevented the operation. (*Enquiry*, Part II, VI, iv)

A similar epistemic solution (that chance events are caused, but the causes are not known) is also embraced by Bertrand Russell:

> What do I mean by a 'chance' event? I mean one of which the causation is unknown. (…) I should regard the birth of Napoleon as a 'chance' event. We do not know why a man of supreme military genius was born in Corsica at that time (Russel, 1944, p. 738).

But Russell had previously employed chance in different ways, and some examples he gave certainly do not fall under the present category of chance. Let us see two of his illustrations:

> The best example of a 'chance' event which had large consequences (…) [was] the German decision in 1917 to allow Lenin to go to Russia. I call this a 'chance' event because, obviously, the German government must have thought of strong reasons on each side, and might just as easily, so far as we can see, have come to a contrary decision (Russel, 1944, p. 738-39).

Here he seems to employ chance in the sense that there seems to be equally compelling reasons for deciding in favour of, say, A, B and C. There is something that led to C rather than A or B, but we do not know what it is – given the situation.

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[1] Quotations from *An Enquiry Concerning Human Understanding*, Harvard Classics, Volume XXXVII, 1910 edition, and from *A Treatise of Human Nature*, 1978 edition, are followed, as per standard practice, by part, section and paragraph.

Elsewhere Russell illustrates chance differently again, by means of a counterfactual that is quite a departure from reality (and not an unknown cause):

> If Henry VIII had not fallen in love with A. Boleyn, the United States would not exist. For it was owing to this event that England broke with the Papacy, and therefore did not acknowledge the Pope's gift of the Americas to Spain and Portugal. If England had remained Catholic, it is probable that what is now the United States would have been part of Spanish America (Russell *apud* Hook, 1944, p. 673).

Sidney Hook interpreted Russell's initial notion of chance as "events whose causes lie outside the system in which they have effects independently of whether the causes and effects are trivial or great" (Hook, 1944, p. 673). Hook explained that because "we can never know whether any system is absolutely isolated from other systems and events, every prediction concerning the future behaviour of a system is conditional upon its freedom from interference" (Hook, 1944, p. 673); and concluded that Russell's examples of chance events "conform to this (…) notion of chance" (Hook, 1944, p. 673). But, clearly, Hook's example adds something different here; there is an unknown cause, but it is due to a system not being sufficiently isolated (the example of the birth of Napoleon is not of the isolated sort).

Russell rejected Hook's interpretation (Russel, 1944, p. 734-735) and made it clear that his epistemic approach is rather simpler: all events are caused, but when one or more of causes are unknown, we call this a chance event. Applying this to the previous example we can say that event (a) Henry VIII's fancy for Anne Boleyn is a cause of event (b) the English colonisation of the United States, but we do not have the necessary knowledge to infer b from a, so that a causing b appears chancy.

Clearly, some examples given by Russell do not fall under the current sense of chance. Russell's later epistemic approach does not

breach the ontological postulates of causal determinism[2] because all events are understood as being caused. For Russell, nothing really happens by chance, chance is just how we name our failure to identify the causes of an event.

2.4. Chance as an event resulting from the coincidence of independent causal chains

Similar to §2.3 but offering a more subtle and idea of chance, is the notion of chance offered by J. S. Mill, (1974, p. 525-47). The particularity of this position is to define chance as the result of the coincidence of two independent causal chains.

As expressed by Mill:

> Chance is usually spoken of in direct antithesis to law; whatever (it is supposed) cannot be ascribed to any law, is attributed to chance. It is, however, certain, that whatever happens is the result of some law; is an effect of causes, and could have been predicted from a knowledge of the existence of those causes, and from their laws.... An event occurring by chance, may be better described as a coincidence from which we have no ground to infer a uniformity (...) It is incorrect, then, to say that any phenomenon is produced by chance; but we may say that two or more phenomena are conjoined by chance, that they coexist or succeed one another only by chance (…) (1974, p. 526).

The event that occurs at the conjunction of two independent causal chains is what we call a chance event. Mill's position would seem to endorse the view that such chance events are the necessary effect of the two coinciding chains. As coincidences do not conform to any laws, we fail to infer uniformities; therefore, chance events are unpredictable (epistemic thesis), but caused (ontological thesis), nevertheless.

A useful historical example of Mill's idea of chance, which highlights the unpredictability of what happens when two

[2] The view that every event has a cause, and every cause necessitates its effect.

independent causal chains coincide, is the case of the Spanish Armada. In 1588, under the orders of Catholic King Philip II, Spain launched a powerful attack against England's Protestant Queen Elizabeth. The Spanish attack constitutes one causal chain (a), starting from Philip's intentions of conquering England to the planned landing of the Spaniards near London. Given the Spanish superiority in numbers and firepower, one might suppose that the English fleet commanded by Sir Francis Drake would not be able to resist, alone, the invading force; the causal chain was likely to run its course without major problems. Drake's attack forced the Armada to change its course, navigating in the direction of Scotland, where a decisive blow of Fortuna [luck or chance] helped England. The Spanish fleet was caught in one of the most powerful sea storms ever registered along the Scottish coast, and the heavy and less manoeuvrable Spanish galleons were fully hit by the tempest. The fleet quickly became out of control and was scattered. A quarter of the ships were destroyed; sunk at sea or wrecked against the shoreline. Only half of the Armada returned home, after facing further storms and hurricanes on their way back (Hanson, 2005).

The sea storm was another independent causal chain (b), originating from natural causes (tides, sea temperature, winds, barometric pressure, etc.), consisting of a highly complex chain of meteorological events, all causally related. The outcome of the coincidence of (a) the invasion of a powerful armada, with (b) the passage of a powerful storm, can be said to be de facto unpredictable. Since both systems are independent, we fail to infer any uniformity (or laws) capable of predicting the sequence of events once both systems 'coincide' – hence the unpredictability of the outcome. But the destruction of the Armada was, from an ontological perspective, certainly caused by the storm. That we call this a 'chance' event is clearly an epistemic matter – we lack predictive knowledge of what follows when two or more independent causal chains intersect. Francis Drake and Queen Elizabeth, however, attributed the victory not only to chance, but to Divine intervention: the storm became known as 'The Wind of God,' or also as the 'Protestant Wind'.

2.5 Chance as referring to events resulting from Divine Intervention

The fifth definition of chance is also given by Aristotle:

> "Others there are who, indeed, believe that chance is a cause, but that it is inscrutable to human intelligence, as being a divine thing and full of mystery" (Phys. II, iv, 196b6-8, transl. Hardie and Gaye).

Or, as French writer Anatole France puts it: "Chance is perhaps the pseudonym of God when He did not want to sign His name" (France, *apud* Freund, 1973, p. 1).

This idea consists in the belief that reality can be divided into two realms, the realm of God (or Divine) and the realm of men or nature, where the realm of God may causally intervene in the realm of nature. Even if all events in the realm of nature have causes and are determined (part of a causal chain) – no natural system is 'immune' to divine (or supernatural) intervention. Ultimately, no natural event can be predicted or expected with certainty, as God's will might be decisive at any moment, and change the course of events. The chancy element is that no one in the realm of nature/men can know God's intentions or predict when He will intervene. Because of our ignorance of divine matters, we call an event allegedly resulting from Divine Intervention a 'chance' event.

Once more, this is an epistemic thesis: if we knew when and where God is to intervene, we would not call the outcome of the intervention a 'chance' event. Ontologically, such events are caused, and the cause is God, or Divine Providence. To some extent, this view is a reply to the notion of chance in §2.3; our lack of understanding of what caused a chance event can be explained by the fact that the 'hidden' cause is of a different nature – divine or supernatural. When St Augustine talks of chance, he refers to an event whose cause is unknown, but there is a 'definite' cause of all events that are said to happen by chance: Divine Providence (Dudley, 2011, p. 7).

Chance events appear to have an exceptional and accidental character because they do not occur in accordance with known regularities. Because of our ignorance of the 'mysterious' power which caused the event, we called it 'chance' (epistemic thesis). But this only appears to be so because Providence acts as a hidden cause of which men must remain ignorant (§2.3); ultimately, chance events are caused (ontological thesis) on the relevant definitions.

2.6 Chance as the denial of necessity

According to Dudley the definition of a chance event as an event which is not caused by necessitating causes can be found in Democritus and Hume. However, we believe these two philosophers say different things here.

Democritus ascribed the causes of all things to necessity and to chance. One of the leading interpretations of Democritus, however, suggests that his views on chance should be understood not as the denial of necessity, but as something that occurs without *order* or *purpose* (Barnes, 1982, p. 423-6).

The thesis advanced by Democritus is that the order and necessity we perceive on the macro-level of reality is a product of chance, which occurs at the micro-level. His approach to chance had to do with his concern about how atoms behaving disorderly could produce an orderly cosmos "in which atoms are not just randomly scattered, but cluster to form masses of distinct types" (Berryman, 2010). His view was that order can be "automatically generated as a by-product of 'random' collisions between all bodies at motion" (Furley, 1989, p. 79). It is unclear whether the events that occur at the micro-level, according to Democritus, are caused by necessitating causes or not.

Dudley correctly believes that the definition of chance as the denial of causal necessity can be found in Hume. In his footnotes (28-30, p. 9), Dudley presents the relevant passages in Hume which he believes would support his interpretation:

(a) … as chance is nothing real in itself, and, properly speaking, is merely the negation of a cause (*Treatise*, Part II, XI, iv);

(b) 'Tis [sc. necessity is] the constant conjunction of objects, along with the determination of the mind, which constitutes a physical necessity: And the removal of these is the same thing with chance (*Treatise*, Part III, XIV, xxxi);

(c) … since 'tis commonly allow'd by philosophers, that what the vulgar call chance is nothing but a secret and conceal'd cause (*Treatise*, Part III, XII, i);

(d) … liberty, when opposed to necessity, not to constraint, is the same thing with chance; which is universally allowed to have no existence (*Enquiry*, Part I, VIII, xxv);

(e) … necessity makes an essential part of causation; and consequently liberty, by removing necessity, removes also causes, and is the very same thing with chance (*Treatise*, Part III, I, xviii);

(f) … As liberty or chance, on the other hand, is nothing but the want of that determination, and a certain looseness, which we feel in passing or not passing from the idea of one to that of the other (*Treatise*, Part III, II, ii).

In Dudley's interpretation, all these passages would support the view that chance is the denial of necessity. But this cannot be right; Hume's selected quotes often claim something different. Claim (a) is ontological - 'chance' is not something real, similar to Bacon's view in §2.1; (b) is ontological and epistemic – Hume is often interpreted as saying that necessity is not to be found in nature, but is the result of a mental projection of necessity by the mind (causation is a mental notion);[3] (c) is just an epistemic claim - that when we lack knowledge of the causes, we call the obtaining event the result of chance; (d), (e)

[3] Another possible interpretation would be to say that Hume locates *necessity* at the level of laws/regularities, so it is real.

and (f) are claims related to Hume's reconciliation (compatibilism) between necessity and freedom.[4]

It is important to note that Hume is not defining chance as the denial of a cause, but explaining what we mean by it in different circumstances, and by doing so he develops an ontological and an epistemic view of chance:

Ontological: chance is to be contrasted with necessity. According to the view that Hume has an idealistic account of causal necessity, Hume would say that necessity is unreal; it is rather the product of the mind that identifies the constant 'conjunction of objects' because of our natural inclination to assume the existence of a necessary connection between an event and its cause. If necessity is unreal, so is chance.

Epistemic: similar to view §2.3, we sometimes call a chance event one of which we are ignorant of the causes; and it does not entail the belief that the event is uncaused.

Dudley also says that Hume was a determinist who believed in the doctrine that every event has a cause, i.e., believed in the truth of the causal principle (2011, p. 9). But this is contentious. In "Why a cause is always necessary?" Hume says in the case of the coming into existence of some item: "We can never demonstrate the necessity of a cause to every new existence (…) [that every event has a cause] is utterly incapable of demonstrative proof" (*Treatise*, Part III, I, iii). And because we cannot prove the causal principle true, it must be at least logically possible for some events to be uncaused. Consequently, it is at least logically possible for chance to be a real feature of the world.

It is contested among scholars whether causal necessity, for Hume, is to be found only on the level of the mind or if it is located on the level of physical laws. It is also not clear whether Hume believed in the causal principle despite our repeated failures to prove

[4] It is unlikely that 'chance' can be used to solve the controversy between necessity and freedom or free will, so excerpt (f) is misleading.

it true. Chance is, however, to be understood in contrast to causal necessity – but the question of the reality of necessity (and of chance) will be here left unanswered.

2.7 Chance as objective probability

Dowe maintains that if the development of the world, from moment to moment, is at times a matter of chance, then "the world does not know in full detail where it is going next" (2005: 170). This is a metaphysical claim and not an empirical question – it is not expected that science can provide a justification for such a claim, although it is not excluded that empirical investigation could, in the future, confirm that chance is part of how the world works. Dudley exemplifies this view of chance with the work of Charles Sanders Peirce.[5]

According to Peirce there is no evidence in favour of the truth of determinism, but there is scientific evidence which suggests the falsity of this doctrine. Robert Burch presents a useful explanation of Peirce's view:

> … the universe does not display deterministic law. It does not directly show anything like total, exact, non-statistical regularity. Moreover, the habits that nature does display always appear in varying degrees of entrenchment or congealing. At one end of the spectrum, we have the nearly law-like behaviour of larger physical objects like boulders and planets; but at the other end of the spectrum, we see in human processes of imagination and thought an almost pure freedom and spontaneity; and in the quantum world of the very small we see the results of almost pure chance (Burch, 2013).

Peirce believed that the raw results of scientific observations demonstrate that not everything is 'fixed' by a deterministic law, as no scientific measurement is perfectly uniform or provides exactly

[5] Popper or Lewis would have been better examples, but Dudley is giving credit to an early attempt of defining chance as featuring a probabilistic universe.

'the same' results every time – the lack of perfect exactitude was not attributed by him to methodological or experimental deficiencies, but because of nature's indeterminism.

The later Peirce would say that all reality is lawless (at best the laws are probabilistic) and events are the result of chance, where chance has an objective status: he called this view of the 'fallibility' of enquiry Tychism – derived from *tyche* (chance). Fallibility of enquiry for "nature is not a static world of unswerving law but rather a dynamic and dicey world of evolved and continually evolving habits that directly exhibit considerable spontaneity" (Burch, 2013). Spontaneity refers here to the workings of chance.

There is a good chance that Peirce would have embraced indeterminism as proposed by quantum mechanics. Tychism is the doctrine that reality is in fact indeterminate – it is not the idea that chance is lack of knowledge. According to Peirce, in the physical world there are no determining causes whatsoever. Peirce's view on 'spontaneity' is similar to the belief in objective chance. John F. Phillips defines such idea along these lines:

> In the literature on probability, two kinds of probability (…) are generally distinguished. There is subjective probability [epistemic account], which involves the beliefs that someone has which are dependent upon the available information, and there is objective probability or objective chance [ontological account], which involves consideration of the probability of some proposition independent of the information anyone has (2005, p. 267-8).

Lewis (1980) argues that there is a relationship between subjective chance (credence) and objective chance. Lewis theorises that our subjective beliefs (credence) ought to 'match' (be equivalent to) objective chance; where the latter is used to describe what he calls irreducible indeterministic processes. Examples of such cases of indeterminism in nature are radioactive decay and photon emission and absorption. Quantum physicists normally believe that for such phenomena only a probabilistic account may be given.

Lewis's approach to objective chance was to define it as a physical propensity (or disposition) for a given type of physical situation to yield a certain kind of outcome – the objective 'chance' for an event to occur. In his example, if we toss an unbiased coin many times there is a high probability that the frequency of heads will be close to the probability assigned for a single toss (50%): that we observe such a phenomenon is not a consequence of our degree of credence, but a fact resulting from an objective 'disposition' of the world.

Peirce's thesis of nature's indeterminism is an early example of a view that others (such as Lewis) have developed more consistently. According to Lewis's position, for instance, from the alleged indeterminism of nature it does not follow that there is no causation, only that no event is fully necessitated by its causes, or no effect is certain to occur.[6] Lewis's account is probabilistic; we may say that the occurrence of a certain antecedent c raises the probability of a certain consequent e to occur: for every occurrence of c we experience, say, 80% of the time, the occurrence of e, where in the absence of c, the frequency of the occurrence of e is lower than 80%, (or perhaps e never occurs in the absence of c). This is in line with Lewis's understanding of a cause as a difference-maker. Objective chance is clearly an ontological notion, and one that can only exist on the assumption that universal determinism is false.[7]

2.8 Chance as a notion rendering free will possible

There is a mistaken view of chance held by Peirce (Cf. Burch 2013), William James (1979) and Berlin (2002); it is also a mistake which Dudley fails to point out. The mistake is the claim that indeterminism suffices to secure free will. This position is normally associated with non-causal libertarianism.

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[6] Lewis refers to an event as a 'determining' cause even in a probabilistic account. This is a particularity of Lewis theory.

[7] If universal determinism were true, 'chance' could only be used as a reference to subjective probability (Sober, 2001, p. 303).

Libertarians believe that if our decisions were deterministically caused, this would contradict our assumption that we are free agents, because it will never be the case that an agent can do otherwise. To rescue free will from the threat of determinism, libertarians sometimes appeal to the reality of 'chance' to falsify 'necessity' and to support the thesis that humans get to choose (in a libertarian sense). This view consists in saying that 'chance' is the notion we use to make sense of the reality of free willed actions.

Berlin does not deny the ultimate possibility of determinism to be a theory true of our world but points out that this would be inconsistent with the way we think of our moral categories, which seem to require the truth of free will. He also believes that certain 'deterministic' approaches to human history fail to recognise that human behaviour is unlikely to be caused in the same way as other natural events. So, if determinism is true, the libertarian says – if our actions are necessitated by our beliefs and desires – then we are 'unfree' because our beliefs and desires uniquely fix what happens next.

Does it really help the libertarian's case to say that our actions are probabilistically caused by beliefs, desires, and objective chance? The idea that indeterminism is necessary for freedom seems a case of wishful thinking: because we *need* to think of ourselves as free agents to make sense of our moral categories, chance (indeterminism) *must* be an objective feature of the world. But even if we concede that quantum mechanics has proven the world to be 'dicier' and not deterministic, this will still not explain how free will is possible.

Elliott Sober provides a witty example:

> Suppose (…) your beliefs and desires determine what you will do. I now offer you a brain implant, whereby a tiny roulette wheel is introduced into your deliberation process (…) would the operation make you free? It seems implausible … (2001, p. 304).

It seems that instead of being 'enslaved' only by beliefs and desires, now humans are enslaved by "beliefs, desires and a roulette

wheel" (Sober, 2001, p. 304). The roulette wheel provides objective chance, but it does not help the libertarian.

2.9 Chance as a notion referring to events which are mere actualised possibilities

The ninth view of chance, omitted in the list provided by Dudley, is that of Hegel. The German philosopher held the view that chance events are those which are merely possible – in the sense that a merely possible (contingent) event is one that may or may not become actual. For Hegel 'chance' is to be contrasted with necessity (an event must become actual or must not become actual). If a possible event does become a past actual event, then we say that the event only got to be actual by chance. The 'character' of the event is the result of chance.

Now, chance is an important part of *Hegelian* dialectics. To portray an accurate description of chance and its role in Hegelian philosophy of history much more time would have to be dedicated to this matter, and this is not what we intend to do here. It will suffice to say that Hegel did not consider chance to be an empty notion. As Raoni Padui points out,

> Hegel […] can be said to believe that there is [objective] chance in nature […] [therefore] Hegel does not share the dominant philosophical view of many contemporaries that nature is fully determined by causes we do not know. (Padui, 2010, p. 251)

This seems to contrast with Hegel's famous remark that

> the [World] Spirit (…) stands firm against the chance occurrences which it dominates and exploits for its own purpose" (Hegel, transl. Rauch, 1988, p. 58)

Although the notion of a World Spirit (a sort of impersonal force) may be unpalatable for some (for empiricists, for example), this claim is not a contradiction in itself. One way of making sense of this is to say that certain kinds of events (for instance, a revolution) are 'due' at some point of the development of the history of the world. The

occurrence of such an event is something fully (deterministically) caused and necessary (*Notwendig*). However, the actual revolution ('what' occurs, the event that takes place 'out there'), and certain aspects of it – who leads the revolution, who survives and who dies, precisely where it occurs – are mere 'actualised possibilities'; events which are said to be merely possible or contingent, and not necessary. This is not to say that such events are uncaused or caused by chance: 'chance' here refers solely to the absence of necessity (under their specific descriptions as particular events).

We may infer that certain kinds of events are necessary according to (and caused by) the World Spirit; but associated with (and contrasted to) this necessity there are a few possibilities, events which may be actualised, and when they do, they acquire their character (meaning) by chance. So, there is necessity in the real world, that which is caused by the *World Spirit*, but there is also chance, a notion we use to refer to the character of actualised possibilities: their character is to be explained as the result of chance. This is an ontological approach: all events which are not necessitated by the World Spirit can be said to be 'chance' events, because chance is for something to occur in the absence of a determining cause.

2.10 Chance as a notion referring to meaningful unusual accidents

The tenth and final view of chance to be considered is that of Aristotle. The Stagirite gives us different accounts of chance in *Physic*s (II, iv-vi) and *Nicomachean Ethics*. In this section we shall focus on Aristotle's treatment of chance in his *Physics* and try to determine what it consists of.

Aristotle has two terms for chance: *tyche* and *automaton*, which in chapters 4-5 are used indiscriminately. It is only in chapter 6 that these terms are distinguished (cf. Ross, 1936, p. 38). *Automaton* was introduced as the name for the genus, but also and for one of the species of chance events, namely, the sort of chance events that occur in the world of inanimate objects but does not apply to agency. *Tyche,* which from now on means 'luck' or 'fortune', applies to events

brought about by agency, i.e., caused by subjects who can 'think' and 'choose' (197a1-6, b1-2). The philosopher also makes clear that *tyche* is a subset of chance (197a36-b1), so that chance encompasses both luck and certain events in nature (196b21-33, 197b6-22, 198a1-6). Unless otherwise indicated, we shall from now on talk of chance in a wider sense.

When Aristotle introduces his technical discussion of chance in *Physics* II, iv-vi, he clearly states that he intends to do two things: to determine what *automaton* and *tyche* are and how they relate to each other, and to examine how chance falls (if at all) into his doctrine of the four causes. There have been numerous attempts at reconstructing Aristotle's account of a 'chancy' or accidental happening, and substantial disagreement can be found.[8] Panayides (2014, p.115), nevertheless, claims to have identified the points on which consensus among commentators is possible. At a minimum, a luck (*tyche*) or chance (*automaton*) event according to the account given in *Physics* possesses the following features:

a. It must be unusual or rare (196b10-17);

b. It must be incidentally caused (no proper *per se* cause), an offshoot of some teleological causal process 196b23-24, 197a12-18);

c. It must be something for which mind or nature might be responsible (198a5-9).

Aristotle exemplifies *tyche* (196b33-197a6, 12-18). A man has a certain purpose in mind, say, to watch a theatrical play. After deliberating on how to attain such an end, he chooses to go to the marketplace, where the theatre is located. He clearly does so for the sake of something, a teleological process. As it happens, by going to the marketplace he accidentally comes across a debtor, something he did not intend to do. The unexpected event suits him just fine, as it gives him an opportunity to collect the debt – something he desired to do, the fulfilment of an end goal. But it is not something he

[8] e.g. Charlton (1970, 105-11); Ross (1936, 514-525).

intended to do there and then. The encounter with the debtor was incidental, a by-product of the creditor acting with some other intention: going to see a play. It also seems fair to say that it is unusual to collect debt in such circumstances. It looks as if conditions (a) and (b) have been met.

Let us look at (c). Aristotle tells us that any luck event must be something that could, in principle, be the result of deliberate choice, although in the actual case it was not. The man's accidental (*symbebekos*) encounter with a debtor he desired to collect from was an unintended coincidence (*symptoma*) of his going to see a play – clearly not the result of choice. But it could have been so, had the man gone to the marketplace with the intention to collect the money. Thus, the debt collection, the luck event, *could have been* the result of a deliberate choice, an end-oriented causal process, and therefore condition (c) is also met.

Chance events are peculiar in the sense that they look like events that occur for an end, but they lack a determining (*per se*) cause. They occur for the sake of something (196b33, 197a6 and 197b21-22), but not for the sake of their outcome (196b34-35, 197a16, 199b21) – so chance is excluded from the realm of final causes. They look like the outcome of intentionality, and yet, occur because of another reason. Massie summarises this point:

> In chance events everything occurs *as if* an intention [agency] or a purpose [nature] were lurking behind some manifest occurrence … [However] no one or nothing planned what occurred. (Massie, 2003, p. 25).

Aristotle provides us with a useful characterisation of chance, and a clarifying example of the special features a luck event must possess to be qualified as such. But even if there can be some agreement on the definition of chance, important philosophical questions quickly emerge from it. Is chance something real? Does it possess causal powers? Do things occur *by* chance?

Chance is not an illusion, but something real for Aristotle, a view which would enable its interplay with causation: "… it is clear that

luck and chance are something. For we know that such things come to be by luck and that things that come to be by luck are of this sort" (196b14-16). But chance is also indefinite and obscure, so that "nothing would seem to come to be *by* luck" (197a10-11). This is an apparent contradiction. One way of trying to make sense of it is to affirm the reality of chance and of its causal import in relation to the outcome, but to deny it causal powers of its own. Part of Aristotle's solution is to say that even if chance is no true cause, it is so regarded at a time, i.e., we speak of chance *as if* it was a cause (195b 31-33). But chance is not a 'fifth' cause, it must fit somewhere in the doctrine of the four causes applied to a chancy outcome.

According to a testimony given by Simplicius, Alexander of Aphrodisias believed chance was intertwined with the final cause, as it is the outcome of a luck event that appears indeterminate. But from the definition we have seen, any *finality* in terms only of chance is illusory – luck events look *as if* they have intentionality, but they do not. Alexander's thesis is then rejected by Simplicius himself, who claims that chance is how we call an accidental efficient cause.

> It is not the final causes of lucky outcomes that are indeterminate, but the efficient causes, since it is from these that the outcomes of luck might result. (Simplicius, *In Phys*. II, 341.5).

Simplicius' interpretation seems better supported by Aristotle's writings. Chance cannot be a final cause: "luck is an accidental cause of things which are done with some intention other than the outcome itself" (197a6-8). Aristotle does not claim that teleological causal processes somehow produce chance-events, only that chance appears as an *accident* in relation to a process's end or purpose. Chance may be said to be a *per accidens* (as opposed to *per se*) cause in relation to an outcome.

Borrowing an example from Aquinas (who in turn draws from Aristotle), if a gravedigger finds a treasure while going about his work – a goal-oriented behaviour – we say the finding is accidental, as it was not intended or 'properly' caused by the digging (*Ph.* II, 5). The gravedigger is not a *per se*, cause of the finding, only incidentally

so. Yet, the finding of the treasure needs a cause, as it is the sort of thing that could be pursued intentionally. (Cf. Dodds, 2012, p. 38-39). It is also a rare event: all conditions for *tyche* are present.

Chance acts as an efficient cause when something is accidentally joined to an outcome. If someone were to ask, 'What causes such accidents/coincidences?' Strictly speaking, accidents have no proper causes, so 'nothing' directly causes them. But they originate from the coincidence of other processes that have proper causes, and their conjunction renders the result *indeterminate* – and it is precisely such rendering that is said to occur by chance. In addition, the accidental coincidence itself is not the cause of chance, but its effect. As Charlton puts it:

> "It would be more correct, then, to say that a thing due to chance is a concurrent outcome, than to say that chance is a concurrent cause" (Charlton, 1970, p. 108).

In his sixth chapter Aristotle complicates his treatment of chance by now clearly distinguishing between *tyche* and *automaton, or* between luck and chance. Luck is what happens to agents capable of choosing in cases such as the man who chooses to go to the theatre and ends up collecting a debt, or the gravedigger who finds a treasure when going about his work. Animals and inanimate object may be said to 'do' things by chance, such as when a horse lost in a battlefield happens to find shelter (197b-20). When irrational or lifeless entities become part of a causal chain in which the result looks end-like but could not have been aimed at – no agent or no teleological process – we find ourselves within our linguistic rights to call it chancy. As Panayides puts it, Aristotle, "for reasons he does not quite spell out, insists that this type of event could be done due to nature, as it could be *per se* caused by a teleological process involving a non-rational agent." (2013, p. 122). We can speculate, however, that the reason for separating these different modes of chance has to do with Aristotle's treatment of spontaneous generation in *Metaph*. VII. Chance as in *automaton* participates in Aristotle's view that some kinds of matter have the power to undergo change, giving origin to life.

Ross sums up such interpretation very clearly:

> Aristotle recognizes the existence of chance, not as a cause … but as a type of sequence whose general character is that an action or movement, by virtue of some concomitant that happens to accompany it, exceptionally produces a result which, though it was not aimed at, is of a kind that might naturally have been aimed at. It is a name for sequences that simulate the conscious purposiveness of human action … Its essence lies … not in the absence of a necessary connexion between antecedents and results, but in the absence of final causation, in cases in which the result is so strikingly end-like as to suggest to an uninformed observer the presence of final causation (Ross, 1936, p. 41).

By acknowledging the possibility of a chancy non-rational teleological process in nature, Aristotle is by no means endorsing the view that most things in nature do occur by chance. In fact, most things in nature *appear* the result of purpose, such as animal parts and their function. It may be said that, occasionally, an adaptation occurs by chance. But chancy events in nature are remarkable to us precisely because "almost everything in nature has the appearance of adaptation to purpose" (Ross, 1936, p. 43).

Contemporary commentators have often highlighted the interest we, human observers, have on such events: "we ascribe a thing to chance only if we think it remarkable" (Charlton, 1970, p. 106-7). Dudley says that

> some events are meaningful to man, whereas others are not … human beings are at all times attempting to understand events and discover their meaning for their own purposes (Dudley, 2011, p. 23).

So, chance events in Aristotle's account amount to certain unusual meaningful accidents, and what makes these remarkable is the fact that they can be interpreted as relevant for our usual pursuit of goals. It they cannot, we deem them irrelevant; random coincidences which lack the qualifications Aristotle ascribes to chance events.

3. Contrasting Aristotle's account of chance with the other senses

Aristotle would reject the view that chance is an empty notion (§2.1). Chance is real, has no causal powers on its own, fits in the doctrine of four causes, and looks as if it could have been the result of purposeful action: "Spontaneity and chance are causes of effects which though they might result from intelligence or nature, have in fact been caused by something incidental" (*Ph*. II 198a1-8).

To defend a view, such as Empedocles's, that all things in nature are a matter of mechanical necessary causation in which finality or purpose plays an obvious role is by no means to deny the possibility of *Aristotelian* chance. Chance refers to actual events caused either by agency or nature which lack finality *per se* but present themselves to us an end-like result – which is why we deem such unusual cases remarkable and meaningful. Chance cannot be an empty notion if it is to have such qualities.

However, Aristotle would not reject the view expressed in §2.2. Aristotle admits that because we are accustomed to the appearance of things occurring for a purpose, either in nature or in the realm of human affairs, it is natural to be awed at the unexpectedness of chance events – regardless of the distinction between *tyche* and *automaton*. The sense presented in §2.2 offers no thesis on the nature of chance events; it is merely an observation of how human observers subjectively respond when exposed to such unusual meaningful events. It is neither a necessary condition for chance to occur, nor an essential property of our desire to explain such events.

In similar fashion, the sense of chance expounded in §2.3 is an epistemic thesis, so there is *prima facie* no incompatibility with Aristotle's definition. If chance is merely how we call our ignorance of the actual causes of an event, then any ontological thesis on chance and its causal properties, modes, or lack of thereof may simultaneously hold true. It could be said that unusual meaningful accidents present themselves to us in rather mysterious fashion because we fail to identify purpose, which is a cause for Aristotle.

Aristotle's more demanding notion of chance is clearly not reducible to epistemic ignorance, but such views need not collide, for §2.3 abstains from any serious commitment.

The same can be said about §2.4, which presents a more subtle and elaborate form of epistemic thesis. Consider the case of two people who find themselves in the same room for completely independent reasons. Their being in the same room can be independently causally explained, but the confluence of events which ends with their meeting one another is a fortuitous outcome. Such a coincidence or collision of causal chains is often ascribed to chance, as we consistently fail to identify the causes of the coincidence itself, or to foresee it. This epistemic view, defended by J. S. Mill, makes no ontological commitments either.

It is important to observe that §2.3 and §2.4, which talked about causal sequences which coincide, are not just compatible with Aristotle's more demanding notion of chance but are one its components. The man who goes to the market for something else and ends up collecting a debt constitutes one causal chain. The debtor he sees in the market is there for some other purpose. Our ignorance of the causes of their meeting up, a coincidence, may surprise us. Where Mill and Aristotle's views drift apart is in the fact that for the latter the coinciding chains, to be chancy, must look *as if* finality was there all the time, whereas for the former purposeful action is not a requirement. Aristotle's view is not reducible to an epistemic thesis.

The view expressed in §2.5, chance by God's intervention, cannot be explained away that easily if one is to endorse Aristotle's view. An act of God is an intervention, a calculated, purposeful act of bringing about the effect that it is, an event also foreseeable by an all-knowing God – there is no real coincidence or concurrence of causal chains. In practical terms, as humans ignore God's ways, we equal such occurrences with the senses discussed in §2.3 and §2.4. But §2.5 makes ontological commitments incompatible with Aristotle's requirements for an event to count as chancy.

In §2.6 we have examined the view that chance is a denial of causal necessity. Dudley attributed this position to Democritus and Hume, and we have pointed out a few problems with his interpretation of these philosophers, as they often say different things about chance. In the case of Hume, it is also arguable whether a non projectivist account of causation (which would place necessity at the level of the laws) is defensible or not.

Undeniably in need of clarification, such interpretive matters need not afflict us now. If chance is just denial of necessity, is it compatible with Aristotle's view? The short answer would be negative: Aristotle is a realist about causation and causal powers, and talks about necessity when explaining how causes bring about their effects.[9] And in doing so, as Nathanael Stein puts it, "he would appear to run afoul of Humean criticisms of the notion of a necessary connection between cause and effect" (2012, p. 855).

However, as Stein himself elucidates, there is also a long answer to this question, but one which still yields the same conclusion. Aristotle's concept of efficient causation presents the concept of necessity in two distinct kinds of causes: *potential* (causal powers – based on the nature of properties) and *active* (actual causes – based on matters of fact). We have potential necessity when something which has the power to heat necessarily heats something else which has the power to be heated. We have active necessity when a particular flame located under a pot necessarily heats it.

For some commentators the distinction is important.[10] The fundamental idea is that while the necessity located in matters of fact is indeed metaphysical necessity, necessity in terms of causal powers is just nomological necessity, and therefore "slightly weaker than metaphysical necessity" (Stein, 2012, p. 858). According to another interpretation, endorsed by Stein himself, both forms of necessity

[9] For a discussion, see Sorabji (1980).

[10] For a discussion, see Stein (2012, p. 869-873).

constitute a metaphysical tenet associated with the notion of causal determination.

Despite such disagreement, and even we do concede that causal powers amount to nomological necessity, causation is, in Aristotle's view, necessitated. This position clearly conflicts with the view that chance is the denial of causal necessity. As a mode of efficient causation, a chancy outcome, in Aristotelian terms, may be said to be fully necessitated. If Aristotelian chance is necessitated, it would also be at odds with Peirce's view (§2.7), that objective chance is a feature of reality.[11]

In §2.8 we have visited a perennial and controversial thesis that chance (as in indeterminism) is a requirement for free will and argued that it is mistaken. The primary and secondary literature on the topic is immensely vast, and to offer a discussion of it, even briefly and superficial, is beyond the scope of this article. What is of our interest here is to determine if Aristotle, a proponent of causal necessity in matters of fact, would see the thesis of determinism at odds with human freedom, or if he would be a compatibilist of some sort.

Aristotle discussed how we justify praise or blame of one's actions in Book III of *Nicomachean Ethics*, which we have not explored in the previous sections. In a nutshell, Aristotle defends the traditional view that a person is responsible for her voluntary actions in the sense that she can do otherwise than she does. This is an early defence of freedom based on the principle of alternative possibilities (PAP) – a thesis widespread in Greek, medieval and modern philosophical thought.[12] It is also a principle frequently associated with libertarianism, but in the case of Aristotle's that may not be the case.

In fact, whether Aristotle would have endorsed compatibilism or libertarianism is far from clear, for "he does not consider whether

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[11] For a view denying a connection between causation and objective chance, see Hoefer (2019, p. 214-235).

[12] Cf. Pasnau (2003). There are compelling arguments indicating that indeterminism is irrelevant to matters of praise or blame. See Dennett (1984).

moral responsibility is compatible with causal determinism, as a general thesis" (O'Keefe, 2021). Instead, Aristotle thinks of psychological determinism as a greater threat to our ascriptions of moral responsibility. This would be a form of determinism which says that our possibilities for choosing and acting are limited (or even necessitated) by our character traits. If such character traits are ultimately responsible for our actions – if we act as we must, according to our nature – are we still morally accountable?

Aristotle argues that we are capable of voluntary free action within the constraints of our nature/dispositions. Even if character traits play a determining role in term of our choosing and acting, we are in control of shaping up our character, i.e., we oversee our character-traits and henceforth are responsible for our character-determined actions. Thus, there is little sense in saying that a murderer murders out of necessity and is therefore exempt of gilt. Such a view is associated with the idea that we can educate ourselves to be virtuous by habituation: one becomes courageous by acting courageously; magnificent by acting magnificently – just in the same way we acquire other skills (*NE* 2.1). The same is true for vices: one becomes a drunkard by participating in binge-drinking sessions (*NE* 3.5 1114a4-7). At some point a person's character may become so vicious that no return to virtue is possible – so PAP no longer applies. Even then we have the right to blame the vile, for in the past she could have changed her character (*NE* 3.5 1114a12-22).

There is an obvious problem with such a view: it falls into a vicious regress. It is central to Aristotle to say that we are responsible for our character based on earlier actions/choices. Were those actions in the past truly free or also determined by our there-and-then character traits? Are there 'fresh starts' (breaks) in the causal process between actions and character traits? (cf. Kane, 2014). Aristotle is apparently not aware of the vicious regress, and only believes that, as O'Keefe puts it,

> "as long as we need to refer to a person's past actions in order to explain how they came to be the sort of

> person they are, this suffices for showing that they helped form their own character (O'Keefe, 2021).

Based on such a premise, one could argue that humans are always free in the sense that they can voluntarily chose to act on the psychological dispositions that necessitate their actions. This would amount to an early form of compatibilism: our actions are caused/necessitated by our psychological dispositions (among other things), but we have the power to act on such dispositions upon self-examination. Aristotle's talk of necessity in *Metaphysics*, combined with his view that character traits constrain our actions would corroborate the compatibilist thesis. If so, Aristotle does not require indeterminism to hold for free will to be possible: §2.8 is to be rejected.

Nevertheless, it could be argued that the very possibility for self-examination would require the existence of something (an *ego*) outside the causal order – solving the problem of vicious regress – in which case Aristotle's compatibilism is really concealed libertarianism. Later philosophers who engaged in the subject influenced by Aristotle floated towards it. Epicurus, who agreed with Aristotle that we are responsible for shaping up our character, concluded that causal determinism and freedom are incompatible, introducing the concept of indeterministic motion ('atomic swerve') in response (cf. Purinton, 1999). Peripatetic philosopher Alexander of Aphrodisias, building upon Aristotelian ethics, believed that insofar we think of freedom as being capable of acting otherwise, moral responsibility would be incompatible with causal determinism (cf. Long, 1970). Perhaps, had Aristotle become aware of the shortcomings of his own formulation, he would have come to agree with Epicurus or Alexander. A final verdict on Aristotle's (in)compatibilism is still out.

There is one more compatibility for us to analyse, which is Hegel's view of chance as actualised possibilities (§2.9). A verdict can here be reached rather quickly. For Hegel, not all events are necessitated by the *World Spirit*. Some events which are mere possibilities become actual for some incidental reason, but the

actualisation itself was not necessitated. But for Aristotle every attempt to explain natural phenomena, also events we call chancy, involves a study of causes. This is not to say that all 'four causes' are required to explain a phenomenon, but knowable events are caused, and causation is accompanied by necessity. Aristotle's view of chance, although peculiar in the sense we have seen – meaningful unusual accidents – does not reject necessity. In fact, if chance is a mode of the efficient cause, one can only infer there are no uncaused chance events. Aristotle would therefore reject chancy outcomes as mere actualised possibilities.

4. Final note

Aristotle's definition of chance shares some degree of similarity with the view that chance is the surprising (§2.2) and unforeseeable outcome of two systems which coincide (§2.3 and §2.4). But his view is substantially more complex, as chance (a form of coincidence) is only justifiably invoked as part of an explanation when certain specific requirements are fulfilled. As Aristotle's treatment of chance has special ontological implications, it collides with the views expressed in §2.1, §2.5, §2.6, §2.7 and §2.9. It remains uncertain whether Aristotle would have rejected §2.8.

The etymology of chance in the senses we have expounded demonstrates the recurrent cross-reference between chance and indeterminism. It is often thought that chance is incompatible with determinism, that chance is how we refer to events that do not occur out of necessity. However, out of the ten different senses of chance we have seen, only two are clearly incompatible with the doctrine that events have necessitating causes (§2.6 and §2.7). All other senses are not directly challenged by problems associated with the doctrine of determinism.

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