

This aa 287 is a revised version of aa_249 (reason: I didn't notice that I had already published it once on the web)

https://bigthink.com/hard-science/surprise-theory-of-everything-symmetry-order-disorder/?utm_campaign=weeklynewsletter&utm_source=rejoiner&utm_medium=email&utm_content=05%2F25%2F23+Smarter+Faster&rjnrld=5AjjNxZ

[Hard Science](#) — May 18, 2023

A surprise new “theory of everything” involves the symmetry between order and disorder

There may be a symmetrical interdependence between order and chaos.



Credit: Annelisa Leinbach / Big Think

Key Takeaways

- For thousands of years, philosophers and scientists have asked: Is our world ruled by order or by disorder?
- Thinkers in various fields and disciplines are now exploring the idea of a fundamental symmetry between order and disorder.
- All the laws of nature are built upon certain symmetries, but symmetry alone is subject to itself.

[Denis Noble](#)

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Is our world ruled by order or by disorder? It is not just a big question. It is an old question that has engaged philosophers and scientists for thousands of years. We can trace it back to ancient Greek philosophers, to Egypt's pharaoh dynasties, to ancient Chinese Taoists, and to Buddhism's origins in India. And it is also a question that is very relevant to life in the West today.

Towards the end of 2019, before the coronavirus pandemic hit the world, I was visited in my laboratory by the writer and philosopher Benedict Rattigan, who invited me to join a fascinating project he was launching. He presented an idea that we have fundamentally misunderstood symmetry, and that its reach is far more extensive than has previously been recognised.

Rattigan's theory intrigued me, and we worked together to invite other leading Oxford professors specialising in multiple disciplines to explain in lay terms the role of symmetry in their fields of mathematics, music, logic, philosophy, physics, chemistry, astronomy, and biology. Their lectures were delivered at a public event at the British Museum in January 2022.

What is the common theme running through the various "languages" of symmetry? There may not be just one common theme, of course. The concept of symmetry is used in significantly different ways, for example, in physics, where [symmetry-breaking](#) plays a central role in explaining the evolution of the universe, and in its use in art, where good proportions are key. But there is one sense of symmetry that stands out from the variety of forms: a fundamental symmetry is that between order and disorder.

It may seem paradoxical to suggest that Nature's ordering principle encompasses a symmetry between order and... well precisely disorder. Virtually all 19th-century scientists, and most 20th-century scientists, would have recoiled in horror at such an idea. But what we found as the talks were drafted was that each form of the language of symmetry revealed a new aspect of the order-disorder principle.

In my own field of genetics, for example, I have been able to demonstrate that rather than disorder being passively experienced by living organisms, they harness that randomness and use it as a tool with which they can generate many possible solutions to environmental challenges. I presented a paper on this subject at The Royal Society in 2016, but at the time I didn't see it as a symmetry issue. More recently, however, I have come to understand why this process happens: it places the harnessing of disorder as part of a deeper symmetry process by which order and disorder interrelate.

If symmetry has no deeper cause than itself, then the cosmos has been structured in the only way possible.

Empirical evidence for the symmetry between order and disorder is hiding in plain sight all around us. In 1999, the Danish physicist Per Bak suggested to a group of neuroscientists that the brain works on the same fundamental principles as a sand-pile. Imagine an hourglass. Grain after grain, sand falls from the top of the hourglass to the bottom. The pile of sand at the

bottom of the hourglass becomes increasingly unstable, and at any moment a single grain of sand might cause a small avalanche. When this happens, the base of the sand-pile widens, which increases its overall stability, after which the process repeats itself.

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Is our world ruled by order or disorder? It's not just a big question. It's an old question that has preoccupied philosophers and scientists for thousands of years. We can trace it back to the ancient Greek philosophers, to the Egyptian pharaonic dynasties, to the ancient Chinese Taoists, and to the beginnings of Buddhism in India. And it is also a question that is very relevant to life in the West today. Towards the end of 2019, before the coronavirus pandemic hit the world, the writer and philosopher **Benedict Rattigan** visited me in my lab and invited me to join a fascinating project he was starting. He presented the idea **that we fundamentally misunderstood symmetry**, (I understood it **as an "equation"** in mathematics, i.e. as an abstract **equality of left and right sides**, while this "mathematical equality physically in the universe does not exist. (!) That is, the equality-equation exists in the reality of being **only as a "selected stop-state, as a rare phenomenon"**, not as something that applies "forever". If I take the universe and "cut out" any arbitrary volume (I will cut out a location in some physical state), then it will have 99% asymmetry, and 1% symmetry... nevertheless, we claim that the law of conservation of energy, momentum, baryon numbers, conservation of "dominance of matter over antimatter" applies and must apply and the conservation of the flow of time "only" in one arrow and other laws of "equations" = conservation...etc. - - How should we understand and understand symmetry better than in *my principle* **Principle of alternating symmetries with asymmetries**, from the beginning of the universe to today, everywhere!, as the principle of genesis "in this universe"... and that its reach is much wider than previously recognized. I was intrigued by **Rattigan's** theory and we collaborated to invite other leading Oxford professors specializing in various fields to explain in layman's terms the role of symmetry in their fields of mathematics, music, logic, philosophy, physics, chemistry, astronomy and biology.

+ They did not invite HDV. In order for entropy, i.e. disorder, to increase, the previous state had to be more ordered, i.e more complex, but since big-bang that complexity is also getting bigger and bigger (at first only quarks and leptons, then atoms, then molecules, compounds, etc.) ... ; but as I have shown: it starts with plasma ""first matter"" =100%, then ""74%" of hydrogen is "produced" (the amount will remain constant), then 24% helium is "produced" (and this amount remains constant), then carbon is "produced" approx. 0.6%, then oxygen is approx. 0.004% ... etc. etc.; "the amount of each higher complexity of matter decreases in a geometric series until we reach proteins, e.g. 10^{-45} % proteins, and DNA then 10^{-105} % ; I make up the numbers (!), which is the "most complex" complexity only on Earth and nowhere else in the Universe. → pyramid of complexity. **→ quality times quantity = 1x1**].

http://www.hypothesis-of-universe.com/docs/aa/aa_037.pdf . http://www.hypothesis-of-universe.com/docs/aa/aa_037.pdf

http://www.hypothesis-of-universe.com/docs/eng/eng_009.pdf ; http://www.hypothesis-of-universe.com/docs/aa/aa_034.pdf ; This means that for each higher complexity = orderliness it will "jump" in an increasingly smaller volume of the Universe, and this entity will then "disintegrate" entropically, i.e. local disorder grows. This idea-reflection needs to be specified. ((... I will leave something from the Theory of Everything to the physics student)) Further to entropy, this opinion: http://www.hypothesis-of-universe.com/docs/aa/aa_227.pdf ; http://www.hypothesis-of-universe.com/docs/aa/aa_183.pdf ;

Their talks were given at a public event at the British Museum in January 2022. **) shame they are hard to find.. What is the common theme running through the various "languages" of symmetry? Of course, there doesn't have to be just one common theme. The concept of symmetry is used in a significantly different way, for example in physics, where **symmetry breaking plays a central role in explaining the evolution of the universe**, **I have my >Principle of alternating symmetry and asymmetry< presented on the net for 20 years**, and in its use in art where good proportions are key. **However, there is one sense of symmetry that stands out from the variety of forms**: the basic symmetry is **symmetry between order and disorder**. It may seem paradoxical to claim that the **principle** of nature's ordering involves a symmetry between order and, more precisely, disorder. http://www.hypothesis-of-universe.com/docs/eng/eng_008.jpg Virtually all 19th century scientists and most 20th century scientists would have recoiled in horror at such an idea. But what we found when the interviews were conceived was that each form of symmetry language revealed a **new aspect of the principle of order and disorder**. **What? How many are there?** In my own field of genetics, for example, I have been able to demonstrate that instead of passively experiencing disturbances, living organisms **take advantage of this randomness** and use it as a tool, http://www.hypothesis-of-universe.com/docs/eng/eng_009.pdf ; http://www.hypothesis-of-universe.com/docs/c/c_028.jpg ; http://www.hypothesis-of-universe.com/docs/aa/aa_008.pdf with which they can create many possible solutions to environmental problems. In **2016**, **Me too** : http://www.hypothesis-of-universe.com/docs/aa/aa_037.pdf **in 2016** I am on The Royal Society submitted a paper on this topic, but I **didn't see it as a symmetry problem at the time**. However, recently I have come to understand why this process occurs: **sorting out disorder is part of a deeper process of symmetry**, **Many years before I had considered step changes, big step changes, i.e. the "principle of alternating symmetries with asymmetries" one of the most basic principles**, **but no one read it, no one noticed it**, and those who might have read it, **only drooled**. in which order and disorder are related. If symmetry has no deeper cause than itself, then the universe was structured in the only possible way. **Empirical evidence of symmetry between order and disorder is hiding in plain sight all around us**. In 1999, the Danish **physicist Per Bak** proposed to a group of neuroscientists that the brain works on the same basic principles as a pile of sand. Imagine an hourglass. Grain by grain, the sand falls from the top of the hourglass to the bottom. The pile of sand at the bottom of the hourglass becomes more and more unstable, and at any moment a single grain of sand can cause a small avalanche. When this happens, the base of the sand pile expands, increasing its overall stability, after which the process repeats.

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(02)- (02) Bak observed that the sand-pile maintains order by means of these random and unpredictable avalanches, which is an example of disorder being "harnessed" by the sand-pile as a means of maintaining order. In other words, there is a fundamental interdependence

between them. It has been demonstrated that this model can be applied to a wide variety of different phenomena, from financial markets and traffic flows to earthquakes, black holes, and the distribution of galaxies in the universe.

Another example of order and disorder forming a symmetry can be found in that most random of phenomena, crowd behaviour. Rattigan writes:

Watching a group of people negotiating a bottleneck at the doors as they filed into a lecture theatre, I observed what I, as a layman, would describe as chaos. But any social scientist will tell us that the behaviour of a cluster of people conforms to broadly predictable patterns, patterns that are determined by factors such as geometric boundary conditions or time gap distributions. It's these factors which are calibrated in order to improve design elements in lecture halls or theatres. So what I perceive as chaos is, in fact, randomness existing within a framework of order... Life seems to exist at this border between order and randomness.

As the team at Oxford explored [symmetry](#) in their different disciplines, we realised just how multifaceted it is. One is aware of it in musical composition as assonance and dissonance, or you might catch sight of it in biology as a transformation that leaves an object unchanged. Frequently it is elegantly simple, whilst occasionally it can be so contradictory as to be almost incomprehensible. It is both orderly and disorderly, logical and illogical, transparent and opaque. But why is symmetry so symmetrical? The conclusion we reached is this: because it conditions its own structure. Whereas all the laws of Nature are built upon certain symmetries, symmetry alone is subject to itself.

In Nature's laws, complexity never develops beyond necessity. The best designs are simple, and the best designer is Nature itself. Finding that there is a fundamental symmetry between order and disorder that can run through all our explanations is like discovering a clarification that was always waiting there to be revealed. Whereas this seems at first to be illogical, if symmetry were life's ordering principle then it would necessarily have infinite reach and encompass everything, including itself. This would create a paradoxical universe of symmetry and asymmetry, of cosmos and chaos. Our universe, in other words — a place of infinite symmetries in which the co-existence of order and disorder is not only in evidence, it is inevitable. If symmetry has no deeper cause than itself, then the cosmos has been structured in the only way possible.

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(02)- Bak observed that the sandpile maintains order with these random and unpredictable avalanches, an example of disorder being "used" by the sandpile as a means of maintaining order. In other words, there is a fundamental interdependence between them. It has been shown that this model can be applied to a wide range of different phenomena, from financial markets and traffic flows to earthquakes, black holes and the distribution of galaxies in space. Another example of order and disorder forming symmetry can be found in that most random of phenomena, crowd behavior. **I may have gone a bit further than the physicist Per Bak or the philosopher Benedict Rattigan, because I am already talking about the process of using that principle, i.e. using alternating symmetries with asymmetries, which leads to a pyramid (developmental pyramid) complexity, against entropy.** http://www.hypothesis-of-universe.com/docs/eng/eng_096.pdf **Rattigan** writes: As I entered the lecture hall and observed a group of people negotiating the obstacle at the door, I observed what I would

describe as a layman **like chaos**. http://www.hypothesis-of-universe.com/docs/eng/eng_008.jpg ; http://www.hypothesis-of-universe.com/docs/aa/aa_013.pdf (they get together and debate over coffee, I'm exposed to loneliness and yet I have the same mindset as them "in that solitary cell") .But any social scientist will tell us that the behavior of a group of people follows generally predictable patterns, patterns that are determined by factors such as geometric boundary conditions or the distribution of the time gap. It is these factors that are calibrated to improve design elements in lecture halls or theaters. **So what I perceive as chaos is actually randomness existing within order.** OK I'll remind you again http://www.hypothesis-of-universe.com/docs/aa/aa_037.pdf Life seems to exist on this border between order and randomness. **When the team at Oxford explored symmetry in his various disciplines, we realized how multifaceted it is.** (They didn't have a bunch of spitting goons behind them who chased instead of dialogue. I did). One realizes this in musical composition as assonance and dissonance, or you can see it in biology as a transformation that leaves an object unchanged. It is often elegantly simple, although at times it can be so contradictory as to be almost incomprehensible. It is ordered and disordered, logical and illogical, transparent and opaque. But why is symmetry so symmetrical? **Because it is a state of non-curved 3+3 dimensions. A = A.**

And the alternation of symmetries with asymmetries conditions the development of complexity. Counter-entropy. The conclusion we reach is this: because it conditions its own structure. While all laws of nature are built on **certain symmetries**, symmetry itself is subordinate to **itself**. **Well, that's a pretty Solomonic excuse... it couldn't have been better, huh?!** http://www.hypothesis-of-universe.com/docs/aa/aa_037.pdf Complexity never grows beyond necessity in the laws of nature. **So why would amphibians evolve from fish, and reptiles from amphibians, when all the fish need is to remain fish...what?** The best designs are simple and the best designer is nature itself. Discovering that there is an underlying symmetry between order and disorder that can run through all our explanations is like discovering a clarification that has always been there waiting to be revealed. **That's what Solomon said again. Why would quarks and leptons turn into sulfuric acid in the future and those into frogs and crocodiles, right? – Here he does not wait for the "revelation" or the effect to clarify the cause. Consequences are "born" according to some "principle of compounding simple states into more complex states" - genesis, i.e. my development pyramid.** http://www.hypothesis-of-universe.com/docs/aa/aa_037.pdf Even if it at first it seems illogical, if symmetry were the ordering principle of life, then it would necessarily be infinite in scope and encompassing everything, including itself. This would create a paradoxical universe of symmetry and asymmetry, cosmos and chaos. Our universe, in other words — a place of infinite symmetries in which **coexistence of order and disorder** it is not only evidence, it is inevitable. **Sure, but I'm not sure how you interpret that...** If symmetry has no deeper cause than itself, then the universe was structured in the only possible way. **Exactly. The Principle of alternating symmetries with asymmetries is necessary for genesis, it conditions the development of complexity.** (apparently there is a misunderstanding here).

JN, 28/05/2023

Second comment 11/25/2023