The Dangers of Occam's Razor

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Abstract

Occam's razor – that is, the methodological principle of parsimony that advocates for the hypothesis with the fewest assumptions possible – is largely considered to be a sound epistemological practice. Indeed, it was and remains a valuable tool for scientific and philosophical inquiry. However, we argue that a too rigid application and, in some instances, an almost obsessive mandatory use, has frequently turned away from a reasonable and sound heuristic approach, making of it an unwarranted and ineffective epistemological method. Some words of caution are necessary to clarify how, contrary to common belief, a too strict adherence to such a principle does not guarantee scientific rigor, rather it can obstruct further progress.

1. Introduction

'Occam's razor' (or 'Ockham's razor') is a principle also known as the *'law of parsimony'* according to which *"pluralities [entities] should not be posited [multiplied] without necessity"* (*"pluralitas non est ponenda sine necessitate").* This principle was first introduced by the English Franciscan friar William of Ockham (1287–1347), an academic philosopher and theologian. It states that when confronted with two or more competing theories that are supposed to explain the phenomena, one should favor the simplest approach. Equivalently, it states that the simplest solution to a problem should be considered the most likely one.

As a theologian, Occam was concerned with metaphysical inquiries, such as the ontology of universals, but his principle is nowadays frequently applied in formulating modern scientific theoretical frameworks. If different hypotheses make the same predictions or describe the same reality and facts, one should take that which is endowed with the fewest assumptions. In the scientific method, Occam's razor cuts out all the seemingly unnecessary assumptions, postulates, ad hoc hypotheses, and eventually, empirically untestable statements that are considered to be unnecessary to explain what we observe. It is a methodological minimalism that looks after the most parsimonious ontology that requires the smallest number of pluralities and entities whilst maintaining sufficient explanatory power to account for all the known facts. Isaac Newton stated the rule as follows: "*We are to admit no more causes of natural things than such as are both true and sufficient to explain their appearances*" (Newton, 1729). In brief: simpler theories and conjectures should be favored over more complicated ones.

This all sounds very reasonable. It is, in some context, to some extent, and in particular conditions. The problem is that this principle of methodological minimalism has been misinterpreted and twisted into a modern form of philosophical minimalism, which cuts off not only putative but legitimate ontological categories, but also everything that does not fit into the currently accepted paradigm. As a matter of fact, the history of science has shown how deeper truths frequently turned out to be less parsimonious and much more complex than what we would like them to be, and an intellectual, philosophical rigor assumed.

Moreover, one should always keep in mind how the principle of simplicity is only one possible criterion of adequacy of a reasoning based on abductive inference[1], also called 'inference to the best explanation' (for a classic review see (Lipton, 2004)). Even what has to be considered the 'best' explanation, and to what extent we should rely on which specific inferential modality, remains a controversial matter of debate. A theory that meets one criteria might not meet the requirements of

[1] Other criteria being falsifiability, consistency, conservativeness, explanatory power, etc.

another, and what we believe to be a ‘good’ conclusion may be colored by subjective background assumptions.

Here, we will first evaluate strengths and weaknesses of Occam’s razor. While it is recognized that it remains an indicator for good scientific practice, we must, at least, be aware of its potential drawbacks and the several historic cases where, contrary to common belief, it did not perform as expected.

A special focus is dedicated to theoretical physics and evolutionary biology. We address the question whether the extraordinary multiplication of (more or less complicated) theories that emerged in theoretical physics in the last decades, is due to a lack of procedural parsimony. While, in evolutionary biology, even though there is no reason to doubt the neo-Darwinian paradigm based on processes of natural selection and random mutations, the findings of the last two or three decades have nevertheless shown that a too strict application of principles of parsimony have led to a much too simplistic understanding of biological process, which complexity are still far beyond our understanding.

A discussion will follow making some conclusive remarks.

2. Pros and Cons of Occam’s Razor

The success of Occam's razor dates back to the inception of science itself. The Copernican revolution, which switched our worldview from a geocentric model to a heliocentric model, did not come about because the natural philosophers had any proof that the Earth is orbiting the Sun. The final proof that the heliocentric system accurately represents reality came about three centuries later (due to the observation at the beginning of the 19th-century of the stellar parallax). Nevertheless, people began to accept Copernicus' suggestion because it is the simplest model that does not lead to 'pluralities' and 'multiplication of entities.' By contrast, the original geocentric model of Ptolemy, which insisted on maintaining the Earth as the central body and each planet moving around an epicycle and whose center travels around a larger circle (the deferent), had to be extended to a much more complicated system resorting to a plethora of other of circles, which again had to move along another circle, and so on. Contrary to common belief, this approach could indeed trace, with a high degree of precision, all the orbital paths on the celestial sphere of all the known planets without having to posit the Sun at the center of the universe. Suppose one adds a sufficient number of circles, one on top of the other, each with an appropriate size and moving with the right angular velocity. Then one can approximate whatever kind of path for objects moving in the sky.[2]

But this was all very complicated. One had to multiply by a considerable number the entities — namely, the epicycles — to have the theory work in accordance with the observations. It is here where the principle of ontological parsimony prevailed: even though at the time it was not at all clear whether it was the true representation of the Solar System, it made much more sense to adopt the heliocentric model because it was much simpler and it 'saved appearances' with only one circle (or ellipse): the planet's orbit around the Sun. This was, and remains, the most paradigmatic and successful example of the application of Occam's razor favoring a conjecture over the other that was still in need of final proof.

However, an aspect that is frequently overlooked is that, historically, this was not the only reason — and probably not even the main reason — why people opted for the heliocentric model. Heliocentrism was not just a different interpretation of reality. Especially with the advent and application of Newton's theory of universal gravitation, heliocentrism became a theory that also had enormous explanatory and predictive power. By strictly mathematical proof, Newton could explain where Kepler's famous three laws of orbital motion come from. They arise as a natural consequence of the gravitational interaction between a massive central body (the Sun) and another smaller one (the Earth). Moreover, gravity in a heliocentric system, tells us when we have to expect the next passage of a comet once we have measured its orbital parameters. Another example that showed the superiority of heliocentrism, was the application of Newton's law of gravity to the observed anomaly of the motion of the planet Uranus and which allowed, in 1846, the French astronomer and mathematician Urbain Le Verrier to predict the existence of another planet, namely Neptune, simply by making a calculation with pencil and paper, without even looking through a telescope. The existence of Neptune was confirmed shortly after by the observations based on Le Verrier's calculations. Such an explanatory *and* predicting power of the theory of gravitation

[2] This is not surprising. It is mathematically equivalent to the weighted sum of harmonic oscillators – that is, to a Fourier series – and that can approximate whatever square integrable function.

in the frame of the heliocentric system was something that adherents to the Ptolemaic geocentric model could only dream of. The epicycle theory could still correctly describe the observed astronomical motion of all the celestial bodies, but it did not predict or explain so much. It is this latter aspect that made heliocentrism the much more appealing option with its simplicity being only an extra bonus.

This does not mean that principles of parsimony did not inspire the scientists of the time; rather, the historical efficacy of Occam's razor has been overemphasized. In fact, one could find opposite historical examples in which the razor was transformed into a chainsaw that cut too deep causing an ontological reduction which went too far and led in the wrong direction or stopped some aspects of science from progressing.

Ironically, long before Occam, Ptolemy himself stated that "*we consider it a good principle to explain the phenomena by the simplest hypothesis possible*" (Franklin, 2001). Considering the Sun, the central celestial body was an unnecessary hypothesis and was, therefore, denied for another 14 centuries. This anecdote alone makes it clear that what is considered 'simpler' or 'unnecessary' depends on what we know and, especially, what we do not know, and is often colored by a subjective personal opinion.

Let us list more modern cases that exemplify the limits of Occam's razor.

In geology, continental drift was long considered an unnecessary and too contrived conjecture to explain the dispersal of species (for an in-depth analysis of Occam's razor misapplications in biogeography, see (Baker, 2007)).

It was thought for a long time that atoms do not exist because they were considered a superfluous metaphysical assumption.

For years, Max Planck refrained from taking seriously his own idea about the discreteness of the energy quanta (which led to the inception of quantum theory) because he considered it a weird and unnecessary assumption that should be regarded only as a provisional working hypothesis (an assumption that the great Ludwig Boltzmann did not dare to embrace). If you did not know anything about quantum physics and relativity, these would appear to be superfluous and much too complicated theories, and Occam's razor would opt for classical physics as the preferred theory. In fact, classical physics once seemed able to describe the entire universe by positing only particles and the classical laws of mechanics and electromagnetism. Nowadays, we know how the theory of relativity — and, especially, quantum mechanics — turned this worldview upside down. The existence of nuclear forces is an entirely unnecessary hypothesis from the perspective of classical physics as well.

The Bayesian character of what is considered to be a 'good explanation' is evidenced also by the quantized aspect of light. Before the quantum revolution it was considered as an established fact that light is a wave since it always behaves like a wave in every experiment involving interference phenomena. The good old 'duck test'[3], which is (more or less implicitly) assumed in abductive reasoning, forced us to the conclusion that there is no necessity to believe otherwise. But Nature gave us a nice lesson on how tremendously subtle it can be and, once quantum physics became an established science, we had to update our knowledge and conceptions of the world accepting also the corpuscular aspect of light, notoriously embodied by the photon.

In biology, proteins, rather than DNA, were once thought to be the carriers of genetic information because they appeared to be a simpler genetic information carrier at the time.

Another historical example that stands out is the birth and application of non-Euclidian geometry. In 1813, the German mathematician Carl Friedrich Gauss extended Euclidian to non-Euclidian geometry by relaxing Euclid's postulate of parallel lines. To put it bluntly: in Euclidean geometry, two parallel lines remain at a constant distance from each other, while in non-Euclidian geometry, they can 'curve towards' and cross at some point, or 'curve away' increasing their distance to infinity. At times, this could have been seen as a completely unnecessary mathematical distraction, an absurd extension – that is, a non-parsimonious hypothesis to deny– without any practical applications. After all, we perceive that space is structured according to the Euclidian axioms, and there was no reason whatsoever to believe that reality could follow different geometrical principles, other than by a mathematical abstract extension obtained by 'unnecessarily multiplying' mathematical objects, such as metric tensors. Fortunately, Gauss and many others who worked on this new geometry were not intimidated by methodological prescriptions a la Occam. They delivered one of the most beautiful theories of modern geometry. It

[3] If it looks like a duck, swims like a duck and quacks like a duck, then it is a duck.

might also be noteworthy that the development of non-Euclidian geometry was not coincidentally embedded in a cultural context in which German idealism was in full swing and which did not uncritically embrace the materialistic naturalism (for a more in-depth account, see also (Ziegler, 1998)). As well known, almost a century later, differential geometry was applied by Einstein to formalize his theory of general relativity, itself one of the most impressive intellectual realizations of the 20th-century. Among many other things it accounted for the anomaly of the precession of the perihelia of Mercury. Something astronomers would have never been able to explain by sticking to the more 'parsimonious' and 'simpler' celestial mechanics of classical physics or the above-mentioned best explanation inference that led to the discovery of Neptune.[4]

In psychology and medicine[5], a too diligent application of Occam's principle had detrimental effects as well. A straightforward application in modern medical education, where clinicians must discriminate between 'relevant' and 'irrelevant' data on the basis of the simplest explanation, could be a quite dangerous medical practice (Whyte, 2018). And, in psychology, as Koleva and Haidt put it: "*Unfortunately, many psychologists place such a high value on parsimony that they will cut away everything that can possibly be cut away, even if the resulting theory fits the data less well. They turn Occam's razor into Occam's chainsaw, clear-cutting the forest until just one tree is left standing. The most famous and disastrous application of Occam's chainsaw was the insistence by radical behaviorists that psychology can get by without mental constructs*" (Koleva & Haidt, 2012).

3. The Case of Evolutionary Biology

One field on which we briefly would like to focus on is evolutionary biology.

It turns out that we repeatedly underestimate our ability to grasp how tremendously complex the biology of life is. For example, the more we study the structure and function of living organisms, even of a single cell, the more we remain surprised by the, until-then, unimagined level of complexity. In hindsight we realize – sometimes much later – that we have in mind a much too superficial model of reality. Applying uncritically principles of simplicity to a natural context that we already know will almost certainly turn out to be much more complex than our present models, is a self-defeating strategy.

A more recent example of this could be seen with the idea that genetic variation and natural selection alone account for all the evolutionary changes in a passive living organism. An idea motivated by a desire for parsimony and simplicity.

It is now widely accepted that this was a quite inaccurate oversimplification.

It turned out that organisms itself can facilitate its own evolution, also beyond mere accident. Cells can rearrange and restructure their DNA with mobile genetic elements. For example, retroviruses infecting cells can insert their genetic material copying and spreading it throughout the genome. These mobile pieces of DNA allow organisms to evolve beyond a process based on mere natural selection and build up the 'non-coding' DNA (once labeled as 'junk DNA') that does not code for protein synthesis but has regulatory functions for genome expression and even capabilities of self-restructuring. Cells have ways of changing their genomes and have capacities of regulating these changes. These could also be determined by environmental factors: evolutionary changes can be caused by ecological ones leading to the creation of new phenotypes without necessarily implying a genotype change. Epigenetic changes can determine how an organism reads its DNA forming different tissues out of the same genome. Which DNA regions are active and expressed are determined by an epigenetic regulation that alters the way the DNA is read and that can change in time. The same region of DNA can be read in different ways – that is, it can encode structurally different proteins. These variations are not directed only by a blind selective or random process, as was once believed, but by the organisms themselves, presumably when under environmental stress. Other processes, such as symbiogenesis – that is, cell fusion – contributes to the

[4] This historical parallel highlights, on the one hand, Occam's razor heuristic usefulness (it made sense to conjecture the existence of a new planet on the basis of an abductive reasoning which considered it the best explanation for Uranus' orbital deviation) but, on the other hand, also the limits of the working hypothesis resulting from it (if the putative 'best explanation' remains empirically sterile and the observational anomaly persists, it may be a good practice to relax the conceptual boundaries and admit for less parsimonious theoretical frameworks).

[5] I cite the cases from psychology and medicine almost as sidenotes at the end of the list only because these are not my fields of expertise. It is to expect that there is much more to say about the misuse of Occam's razor in these fields as well.

evolutionary walk independently from selective and genomic aspects as well. The paradigmatic example has become the origin of mitochondria, and plausibly other cellular organelles, resulting from an endosymbiotic association of a bacteria with an archaea cell.

Overall, the gene-centric model that considered the DNA as something that can ‘selfishly’ act alone by a fixed top-down control, like a computer with a ROM memory, turned out to be grossly misleading. The DNA is more a database, a sort of RAM memory, where the CPU and the program must reside elsewhere. It is mostly a passive tool that cells can use to change itself. We are nowhere near ‘explaining’ life because genes ‘explain’ life no more and no less than the words in a dictionary ‘explain’ literature.

Moreover, it is now clear that single-celled organisms have a degree of sensing and information processing of their surroundings which can hardly be explained inside the orthodox paradigm. A form of ‘basal cognition’ in cells and plants exists that previously was thought to be possible only in organisms with a brain, or at least with a nervous system. This ‘basal cognitive’ behavior in response to environmental stimuli, shapes the evolutionary trajectory that, again, cannot be explained by random mutations and natural selection alone (for a modern review of the elusive concept of ‘basal cognition’ see (Lyon & al., 2021)).

These new findings have been now accepted also by mainstream molecular and evolutionary biology. What, nevertheless, remains a matter of controversy is where the emphasis must be laid. The orthodoxy defends the so called ‘modern synthesis’ by keeping genetic variation and natural selection as the primary evolutionary driving forces. It accepts and also incorporates the above-mentioned factors, such as epigenetics, symbiogenesis, cell’s basal cognition, etc., but regards these as secondary engines of evolution.

Another academic movement incarnated in the so called ‘extended evolutionary synthesis’ (Laland & et, 2015) or ‘The Third Way’ (Website, 2021), considers the gene-centric model of the modern synthesis as outdated and tends to highlight the non-genetic mechanisms as having equal if not even more importance than genetic factors in determining the evolutionary change (Shapiro & D., 2021). The debate is far from being settled but biology might well be on the verge of a major paradigm shift.

It is worth noting how the modern synthesis’ narrow view of evolution played in the hands of the controversial theory of Intelligent Design (ID). While the supporters of ID accept evolution as an established scientific fact, it rejects the self-sufficiency of natural selection and random mutations (advocating for a ‘Designer’ filling the gap). They often argue with Occam’s razor too. An example of this line of reasoning was W.A. Dembsky’s ‘Design Inference’ method where competing explanations are selected with an "explanatory filter" for the best explanation making evolution without design highly improbable (Dembski, 1998). He argued from parsimony principles as a criterion to quantify the likelihood of regularity, chance, or design in evolution. This got a prompt critical rebuttal by several authors. For example, Fitelson et al. proposed alternative simplest explanations based on more parsimonious orderings leading to the antipodal conclusion (Fitelson et al., 1999). Only this single case makes it clear how it is our metaphysical and ideological background with all our personal qualitative and subjective assumptions and premises that determines whether a hypothesis is parsimonious, simple, or unlikely.

Whatever the case, the almost exclusively gene-centric view of life turned out to be based on unwarranted assumptions that were questioned only rarely. Despite all the evidence to the contrary, the image of an evolution that is almost entirely ruled by few principles resists reformation. The undeclared and more or less unaware methodological approach is that of Occam's razor: evolution can be explained by natural selection and genetic variation alone, there is no reason to assume otherwise. This background assumption of immutable philosophical rigor prevented us from seeing further. Science never looked beyond this accepted paradigm and overlooked other phenomenon and the discovery of other principles and forces at work, despite displaying itself in front of our eye. Fortunately, Nature couldn’t care less about our anthropomorphic principles of ontological parsimony and simplicity.

1. The Case of Theoretical Physics

After the success of the standard model of particle physics in the 1960-70s, a theory of quantum gravity – that is, a theoretical framework that unites Einstein's general relativity with quantum mechanics in a unique model – seemed to be at hand. However, four decades later, still no model is in sight that unifies gravitational forces with electromagnetic and nuclear forces into a coherent and self-consistent picture, let alone any experimental evidence that could suggest a way to accomplish such unification. Moreover, a quantum reality which suggests weird ontologies where particles can be in a superposition or entangled states, where local realism no longer holds, random processes reflect a theory without hidden variables and where the infamous Einstein's ‘spooky action at a distance’ is commonplace, further added uncertainty to the conceptual foundations of theoretical physics.

This resulted in a lack of substantial progress in the field which, however, is paradoxically characterized by an explosion of theoretical models, at times compound by quite mathematically complex and conceptually contrived notions, each presenting itself as a candidate for a theory supposedly leading to a paradigm shift. A plethora of theories of quantum gravity (e.g., string theory, canonical quantum gravity and many more) and interpretations of quantum mechanics (e.g., the de Broglie-Bohm pilot wave theory, the Many Worlds Interpretations (MWI), and many more) were developed throughout the decades. This resulted in an endless series of speculations, conjectures and, not rarely, unfalsifiable hypotheses, such as the existence of the multiverse or of our universe branching into many ‘Worlds’.

Not exactly an intellectual practice minimizing entities. In fact, among other things, this also has contributed to an increased dissatisfaction that lead to an appeal to a more rigorous and radical application of razors, blades and knives.

Curiously, however, the proponents and supporters of each of these alternative theoretical frameworks or ontologies, claim their model as being the most parsimonious. For example, the MWI can be considered the most parsimonious and simplest one because it does not introduce any new entity at all, rather multiplies only the present one (our universe). Moreover, Hugh Everett, the father of the MWI, explicitly posits the superiority of his interpretation on the grounds of what (to him) appears as a criterion of conceptual simplicity that should increase the confidence in a theory without many ad hoc constants, restrictions, independent hypotheses and free from arbitrariness (Everett, 1956).

After the enormous predictive power of the standard model became clear, string theory was developed as the leading candidate that should have extended it.[6] String theorists claim that their theory is the most parsimonious (and beautiful) one because it posits only one type of fundamental object building up the entire universe, namely the string. On the other hand, quite apart from the fact that string theory failed to make experimentally detectable predictions, it requires the addition of a lot of odd components, such as extra dimensions or supersymmetric particles, and is vitiated by several degrees of freedom that led to the multiverse landscape conjecture.

The bottom line is that everyone finds an escape that justifies his or her normative adherence to a principle of simplicity or parsimony and which is yet another evidence that highlights its subjective dimension. Occam does not have only one razor but possesses an entire set of cartridge razors. The delimiting criteria that identifies an explanatory construct as ‘parsimonious’, ‘simple’, having the ‘fewest assumptions’ and ‘necessary’ or ‘unnecessary entities’, is in the eye of the beholder, not an objective definable requirement, no more and no less as criteria of ‘beauty’ or ‘elegance’. The disordered proliferation of (more or less fancy) speculations in the modern landscape of theoretical physics is not associated to a lack of obedience in an abstract normative principle. The reasons for this phenomenon are much more articulated and complex, remaining a matter of controversial debate but, in our view, the stagnation of modern theoretical physics has much deeper reasons rooted on one hand in the factual lack of experimental data and, on the other hand, in a systemic educational and academic structure unfit to cope with such a state of affairs.

2. Discussion

These were only a few examples of a long list that should make it clear how Occam's razor is no more than a heuristic principle, a rule of thumb, which effectiveness has been largely overemphasized. It can be a valuable point of departure for a scientific investigation and a useful approach to forward

[6] I would like to add as a personal note that, in my view, the standard model of particle physics is anything but a simple or parsimonious theory, let alone a mathematical structure based on few assumptions. It is a quite cumbersome and contrived theory where absolutely nothing reminds of Occam’s precepts. And yet it turned out to be one of the most successful theories of modern science.

sober hypotheses. In some sense it could justify some initial 'epistemic inertia' that can lead us in the right direction.

Recently, I. Mazin appealed all scientists for a more thorough application of Occam's razor, complaining about an 'inverse Occam's razor' plaguing the scientific community, and which manifest in the *"worrying trend to favor complex interpretations"*, because *"they are perceived as more impactful"* (Mazin, 2022). Scientists prefer to frame exciting interpretations because these get easier through the editorial and peer-reviewed process into high-profile journals. It is not a rarity to see exotic explanations mesmerizing scientists for years based on experimental data that later turned out to be flawed. We agree with Mazin's conclusion: it should be admissible to present new experimental data with no attempt to search for contrived speculative models that supposedly explain it in the first place.

But this is why a delicate balance between an excessively hypothetical and fancy theoretical practice and an awareness of the limits of a too strict adherence to a principle that cuts out potentially powerful intuitions, is an even more necessary methodological receipt. Because, if with time passing by no tangible results emerge from its application, that could be due to the fact that it has become a chainsaw that cuts off less parsimonious but correct hypotheses. The fact that a theory does (or does not) pass Occam's razor test is not proof that it is (or is not) the correct explanation. Too much depends on whether we have a complete understanding of the complexity of the phenomenon we want to describe or whether we still do not. If one misses that complexity and does not know all the underlying laws, processes, and variables that determine a phenomenon, something we never know for sure, invoking uncritically Occam's razor will almost certainly lead to an oversimplification, to wrong conclusions, and therefore, to a lack of progress. Sometimes deeper truths need a move away from simplicity and parsimony. Also replacing statistical data-fitting estimates with likelihood arguments based on principles of simplicity or parsimony is an unwarranted epistemological move. Occam's razor should not be elevated to a scientific criterion, let alone a proof for or against a conjecture. A quotation credited to Einstein says: "*Everything should be made as simple as possible, but not simpler*."

In fact, a dogmatic application of the principle of parsimony may result in something too simple — that is, something simply incorrect. It can morph a theory of knowledge into a destabilizing intellectual force that acts like an ideological guardian preventing further progress rather than a rational intellectual practice.

Unfortunately, there is a (more or less subconscious) tendency to do precisely that. It is an undeclared law that is followed almost automatically, though more in words and intent than by a consequent behavior. Throughout the history of science, one can observe how it is much more frequent to see Occam's razor being invoked to both defend and attack the very same theory, hypothesis, or conjecture, rather than being able to furnish it with a validating basis. Notwithstanding, there remains a pervading tendency to claim that it is one's own theory, not the rival one, that conforms best, and is in line, with a principle of parsimony. In the end, it is an approach with which people can justify everything and the contrary of everything.

Another psychological and social factor strongly pressures philosophers of mind — perhaps, even more, the dualists, idealists, or non-materialists — to resort to Occam's razor. Material monists invoke Occam as a rational and scientific criterion for dismissing any metaphysical assumption. "We don't need to posit anything immaterial to explain consciousness and mind. Let us invariably parse away with a razor every dualism or pluralism; there is only matter." So goes the mantra. [7] The dualists, eager to show that they are just as analytic, rational, and scientific as their physicalist colleagues, jump on the same bandwagon and invoke the same principle, obviously to defend the opposite thesis. However, this equally questionable attachment to principles of parsimony and simplicity does not have its roots in a genuine conviction of a sober and well-thought methodology. Rather, it is prompted by the desire to please and appease (in most cases without success) their counterpart. They feel compelled to repeat words like 'parsimony,' 'simplicity,' and 'unnecessary' only because they believe that this makes them look more rigorous, analytic, and scientific and distance themselves from too-mystical positions. But, this has never been successful or convincing, nor has it been in any way productive.

At any rate, to my best knowledge, I could not find a single historical case in which this minimalist approach settled a debate. In science, the explanatory and predictive power of a theory confirmed by

[7] It should be noted how in contemporary metaphysical discussions, skeptics and atheist invoke Occam's principle to support a physicalist worldview–an application that a friar could hardly have had in mind.

experimental evidence has always been the ruler in the court, whereas in philosophy, cutting razors were never the criterion that allowed for the prediction of the fates of rival theories. I have never seen someone changing his/her mind because of a theory or hypothesis based on its supposed parsimony.

Like it or not, ultimately, we choose a worldview because of our personal preferences, our belief systems, and our unconscious (necessary or unnecessary) assumptions. In science, we cannot dismiss or blindly accept something only on the grounds of an abstract and limited principle. A too straightforward application of such a principle has not only frequently led to wrong conclusions but has made us also blind to new phenomena and prevented science from progressing further.

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