



# Ockham's Razor: sharpen or re-sheathe?

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## DECLARATIONS

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*Numquam ponenda est pluralitas sine necessitate*

William of Ockham (1285–1349)

Difficulties in making diagnoses occur frequently in all areas of clinical medicine. There may be no match between our findings and the disease entities we know of, the diagnosis may be muddied by confounding factors, or there may be strong evidence of more than one disease entity at work.

How should the physician react to these challenges in order to correctly diagnose and optimally treat the patient? This article began by stating the principle of parsimony, better known as 'Ockham's razor', (also spelt 'Occam').<sup>1</sup> William of Ockham, its creator, was a Franciscan monk in the early 14th century who studied Theology at the Universities of Oxford and Paris. The principle, *Numquam ponenda est pluralitas sine necessitate*, has over the years been interpreted in a number of ways but is perhaps best translated as 'Plurality ought never be posed without necessity' - that is, the simplest and most unifying explanation for any given problem is the one most likely to be correct; the idea being that other, less satisfactory, explanations are 'shaven off' in the process.

Imagine a patient presents to casualty complaining of headache, neck stiffness, fever, and confusion - it is of course perfectly possible that he simultaneously developed a subarachnoid haemorrhage, torticollis, and hepatic encephalopathy. However, Ockham's razor offers us a single diagnosis that fully accounts for this single presentation and guides us to a diagnosis of meningitis -

the explanation that requires the fewest number of assumptions.

For centuries, Ockham's razor has proved to be an effective tool for weeding out unfavourable hypotheses and scientists use it every day even when they do not cite it explicitly.<sup>2</sup> More recently, the principle has spawned a number of nominal variations including the 'principle of simplicity' and the 'KISS principle' (Keep It Simple, Stupid). It is perhaps most eloquently described in Samuel Shem's famous semi-autobiographical novel *The House of God*, 'When you hear the beats of hooves, think horses, not zebras'.<sup>3</sup>

In a 2004 episode of the popular US medical drama, *House, M.D.*, a 19-year-old male collapses and presents to hospital with a rather incongruous set of clinical features: hypotension, nausea, a dry cough, abdominal pain and leucopenia.<sup>4</sup> The eponymous consultant cannot fit the clinical picture together and initially diagnoses two unrelated conditions: a sinus infection and hypothyroidism. Thus the single set of symptoms in this otherwise fit and well man have been met by the rather intellectually lazy pitch of two distinct diagnoses. As the story unfolds, it becomes evident that the man had been self-medicating for a pre-existing viral cough but a pharmacy error had caused an accidental swap between the similar-looking colchicine and his cough medication. Therefore, the components that comprised this strange presentation were actually very simple; a man with a cough took the wrong tablets by mistake. The side effects of the colchicine caused the clinical features unaccounted for by the upper respiratory tract viral infection and so the story becomes complete.

Even though this all seems a little far-fetched at first glance, it is still the simplest and most unifying explanation available. Thus it conforms to Ockham's razor in just the way that House's two separate diagnoses do not.

Being a fit young 19-year-old is one thing, but as we grow older, many varied symptoms may simply be a reflection of many varied and co-existing

pathologies. Thus, there exists a converse, or 'anti-razor' to Ockham's, known as 'Saint's triad'. This describes a specific surgical presentation consisting of gallstones, hiatus hernia and colonic diverticulosis.<sup>5</sup> Its relevance here lies in the fact that since there is no pathophysiological basis for the co-existence of these three maladies, it is possible for multiple pathologies to co-exist but first manifest together in a single presentation.

This is not a new notion; many philosophers even dating from William of Ockham's time – such as Walter Chatton (c.1290–1343) felt – Ockham's philosophy too simplistic: 'Consider an affirmative proposition, which, when it is verified, is verified only for things; if three things do not suffice for verifying it, one has to posit a fourth, and so on in turn (for four things, or five, etc.)'<sup>6</sup>

It follows that if one is to adopt the principle of Saint's triad for a particular presentation, searching for a unifying cause for the given set of symptoms would be pointless. Indeed, it is statistically more probable, especially in the ageing patient, that multiple yet independent disease processes occur to account for an unusual set of symptoms as opposed to a single 'rare as hens' teeth' diagnosis.

Until quite recently, it had been suggested that Ockham's razor did not apply to patients with AIDS since before the introduction of effective anti-retroviral therapy they frequently did have multiple pathological processes occurring at the same time.

It could be argued that the increased likelihood of multiple pathologies occurring together in some way invalidates the application of Ockham's razor but even so, it is still more sensible to first test a theory postulating a smaller number of diagnoses rather than offering one for each malady!<sup>7</sup>

Indeed, when one considers the diagnosis of AIDS from another perspective, Ockham's razor is not invalidated by it but rather is as an ideal

example of its application – perhaps this discrepancy can be accounted for by simple variances in the interpretation of the principle.

On balance, the best practice is probably gained by knowing when to wield Ockham's razor and when to re-sheathe it in favour of Saint's anti-razor. Although the two are undeniably contrary to one another, we need not use one exclusively in medical practice whilst having to dispense with the wisdom of the other. If a 25-year-old man presents with urethritis, conjunctivitis and a recent history of arthritis, surely 'Reiter's syndrome' is neater and more helpful than badging him with three separate diagnoses as if their co-existence was down to a spot of bad luck. On the other hand, our ageing population, and therefore the prevalence and multitude of co-existing yet independent chronic diseases, is set to continue to increase – we must not forget Saint's anti-razor, nor the distant echoes of Chatton either.

As clinicians, we should consider *all* possible causes for a given presentation and seek the *fewest*, but we must not allow ourselves to be distracted by trying to find a unifying diagnosis when it simply may not be present. As the great 20th century physicist Albert Einstein once said, 'Keep things as simple as possible... but no simpler'.

## References

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- 5 Saint CF. Saint's triad: The origin and story of its recognition. *Rev Surg* 1966;23:1–4
- 6 Chatton W. Principle from *Reportatio* (c.1340) I d. 30, q. 1, a. 4
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