**A commentary on**
Dubourg & Baumard "Why imaginary worlds? The psychological foundations and cultural evolution of fictions with imaginary worlds."

**Word Counts**
Abstract:        59 words
Main Text:      999 words
References:    249 words
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**Commentary Title**
The Evolution of Imagination and the Adaptive Value of Imaginary Worlds

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**Abstract**
Characterising the cultural evolution of imaginary worlds as a hedonic but non-adaptive exaptation from evolved exploratory tendencies, Dubourg and Baumard defend too narrow a conception of the adaptive evolution of imaginary worlds.  Imagination and its imaginary worlds are ancient and adaptive, allowing deliberation over actions, consequences, and futures worth aspiring to, often engendering the world we see around us.

**Main Text**

Our world consists of imaginings brought to life. In any city or campus, one is beset with manifested visions: buildings out of the minds of architects, seed trees planted to match groundskeepers' aesthetic anticipations, and clothes conjured by designers. Even the abstractions of scientific fields were visions before they became realities (e.g., what is 'informatics'?). The economic realities in which these institutions dwell are often also the products of imagined worlds that became true because they were believed (Shiller, 2019). These are what Sarbin (1997) called believed imaginings, developing the ideas of William James (1896) who wrote of the will to believe as a force that brings imaginings to life.

In contrast to Sarbin and James, Dubourg and Baumard argue that imaginary worlds evolved out of preferences for exploration, which "propel individuals toward new environments and sources of reward," and which subsequently "have been co-opted by cultural evolution for entertainment". Their arguments treat imaginary worlds as a form of cognitive exploitation: Like a new drug that takes advantage of evolved reward centers without itself offering any evolutionary benefit, imaginary worlds exploit cognition while offering little practical advantage. In contrast, we argue imaginary worlds are evolutionarily ancient and satisfy a range of important needs that persist in contemporary culture.

It is useful to recognize that imaginary worlds predate modern culture. Though Dubourg and Baumard distinguish between the non-fictional worlds of religious narratives and fictional worlds created for "pure entertainment", we find the distinction unhelpful, and likely to stall evolutionary investigation. The diverse origin and religious stories told among indigenous peoples feature rich imaginary worlds populated with fantastical characters (Hills 2018). Many of these exist only as oral traditions, but we have ample records of Norse and Greek mythologies, as well as Sanskrit epics such as the *Ramayana*, which date back millennia. Thus, though a contemporary market has recently arisen around 'fictional' imaginary worlds, the construction of imaginary worlds is much older - predating contemporary bookstores by thousands of years.

It is likely that the adaptive value of imaginary worlds, and the imagination that derives them, predates the diversification of mammals. Agents who can simulate the outcomes of actions prior to acting - what Dennett (1996) calls 'Popperian agents' - have numerous adaptive advantages. These include anticipating and valuing the consequences of potential actions, conceiving of alternative futures they would lead to, and then choosing actions that would better engender those futures which are most preferred (Hills, 2019a). This is a form of self-projection, the capacity to imagine oneself

in an alternate future or counterfactual environment, which is adaptive and, despite previous claims (Suddendorf and Corballis, 2007), is seen not only in humans. Electrical recordings from hippocampal place cells--active when animals are in specific locations--demonstrate that rats are capable of imagining routes they've never taken (Pezzulo, van der Meer, Lansink, Pennartz, 2014). These sources of inner navigation, what Tolman (1948) called 'cognitive maps', are increasingly observed in other vertebrates (e.g., Eliav et al., 2021; Ranc, Moorcroft, Ossi, & Cagnacci, 2021). What these adaptive and comparative biological details tell us is that the capacity to imagine novel experiences is both adaptive and evolutionarily old.

Not only are imagined worlds ancient; they satisfy values beyond cognitive wanderlust, for example, as methods for constructing goals and evaluating actions. To deliberately plant an oak that will live for 1000 years is, minimally, to envisage a future in which that oak thrives. We also engage these imaginary worlds in our own generative self-construction, to determine what we will become (Hills 2019a). Following Darwin, we see imaginary worlds not as a special kind of modern cognitive construction, but as differing by degrees from the imaginings of our non-human ancestors.

As Dubourg and Baumard rightly point out, there is still much to account for in the ongoing cultural evolution of imaginary worlds. Yet, it is worth considering to what extent these imaginary worlds are functionally homologous with the ancestral imaginary cognitions that have given rise to them, or have become exaptations, functionally independent of their origins, now evolving in response to additional features of cognitive or cultural selection (e.g, Hills, 2019b). The literature of imaginary worlds - from folk tales to space operas - would seem to reflect many adaptive values that would be familiar to our ancestors.

Fantasy worlds vary widely but typically provide settings for common themes of existential conflict, reward seeking, and moral and political parables. Thus, imagined worlds can be used as vehicles for instruction, counterfactual reasoning, and future exploration (e.g., Irwin, 2019; Read & Hills, 2021), just as they might to different degrees in children or other animals. Contemporary sci-fi and fantasy elaborate on persistent evolutionary themes, containing not just vivid descriptions of imagined ecologies but almost always actors who are faced with economic, reproductive, and social (e.g., moral and political) challenges. These actors represent persons somewhat like us, even when they are non-human (e.g., *The Fantastic Mr. Fox* and *District 9*). Their challenges are often made more salient by the altered environments they inhabit. Ian McDonald's *Luna* trilogy, for example, contains rich and vivid descriptions of the hostile lunar climate: "*The moon has a thousand ways to kill you*". This environment is not an end in itself; It is used as a foundation for conceiving of a society in which

capitalism has been pushed to extremes, where breathing costs money, and where there are no laws, only negotiations. Thus, the imaginary world of the moon is used as a foundation for asking and answering questions about how we should live in the real world. Often these imagined adventures explore real world conflicts: the central conflict between the Alliance and the Browncoats in *Firefly* was inspired by Michael Shaara's civil war book, *The Killer Angels*.

In sum, imagination and the imaginary worlds it engenders are ancient and adaptive, allowing deliberation over actions and their consequences, the evaluation of futures worth aspiring to, and rendering future challenges more salient. In many cases, they give rise to the world we see around us.

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