Why Monsters Are Dangerous

Olivier Morin
Institut Jean Nicod, CNRS, ENS—PSL University

Oleg Sobchuk
Max Planck Institute for Evolutionary Anthropology

Abstract Monsters and other imaginary animals have been conjured up by a wide range of cultures. Can their popularity be explained, and can their properties be predicted? These were long-standing questions for structuralist or cognitive anthropology, as well as literary studies and cultural evolution. The task is to solve the puzzle raised by the popularity of extraordinary imaginary animals, and to explain some cross-cultural regularities that such animals present—traits like hybridity or dangerousness. The standard approach to this question was to first investigate how human imagination deals with actually existing animals. Structuralist theory held that some animals are particularly "good to think with." According to Mary Douglas's influential hypothesis, this was chiefly true of animals that disrupt intuitive classifications of species—the "monsters-as-anomalies" account. But this hypothesis is problematic, as ethnobiology shows that folk classifications of biological species are so plastic that classificatory anomalies can be disregarded. This led cognitive anthropologists to propose alternative versions of the "monsters as anomalies" account. Parallel to this, a second account of monsters—"monsters-as-predators"—starts from the importance of predator detection to our past survival and reproduction, and argues that dangerous features make animals "good to think with," and should be overrepresented in imaginary animals. This article argues that both accounts understand something about monsters that the other account cannot explain. We propose a synthesis of these two accounts that attempts to explain why the two most characteristic aspects of monsters, anomalousness and predatoriness, tend to go together.

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Imaginary animals could be like imaginary phone numbers. Fictional phone numbers look very much like real ones: no special feature betrays the fact that they are not real (to nonspecialists at least). Likewise, some imaginary animals—the Yeti, the Loch Ness monster, some unicorns—would not be out of place in a real-world bestiary. Fictional entities need not necessarily wear their fictionality on their sleeve (Goodman 1978) and in some ways, fictional animals are rather unimaginative: for instance, they tend to replicate basic body schemas (Ward 1994; Wengrow 2013). Utterly fanciful creations—animals with no sensory organs, animals with detached but functional arms or legs—are rare (though not unheard of). Yet there are good reasons to expect fictional animals to be different from their real-world counterparts. Fictional entities are less constrained, leaving us free to endow them with features that appeal to our imagination. We would thus expect them to be more memorable, more interesting—in a word, more cognitively appealing than real animals.

This idea has been defended by a number of scholars, most notably in the field of cognitive anthropology (e.g., Sperber 1975; Boyer 2001), but also in archaeology (e.g., Wengrow 2013). Its origins can be found in 1960s structuralist anthropology. Claude Lévi-Strauss (1968) and Mary Douglas ([1966] 2003) established the notion that some biological species are, in Lévi-Strauss's famous phrase, "good to think with" (1964: 89), compared to others not as worthy of cognitive or symbolic elaboration. This hypothesis proved widely successful: it was firmly established by Mary Douglas in *Purity and Danger* (see discussion below) and became a staple of structuralist anthropology (e.g., Leach 1989), even though the elements that made up the cognitive appeal of a species varied widely from one scholar to another. Once the basic idea—different animals vary in the material they offer for cultural elaboration—was in place, its application to imaginary creatures was only a small step away. As Dan Sperber (1975) remarked, if some features make certain animals more cognitively appealing than others, imaginary animals should exhibit those features, since they are built by our cognition for its own benefit. If we can figure out what makes some animals more interesting to the human mind, we could predict some recurring aspects of imaginary animals; and by studying monsters and other fantastical creatures, we could understand better how human cognition represents animals. There will probably never be an interesting science of imaginary phone numbers worth investigating, but there could be one for monsters. Real animals may or may not be "good to think with,"

but imaginary ones have to be. To get there, we need to answer two related questions:

First question: What are the properties that make some real animals "good to think with"?

Second question: Do imaginary animals possess those properties?

The first three sections of this article will review several theoretical proposals from the history of cognitive anthropology. These proposals were invented more often to answer the first question, more rarely the second. But we can use them to shed light on both. We first consider Douglas's proposal: animals are fit for symbolic elaboration when they cross taxonomic boundaries or otherwise disturb the way we classify them (what we will dub the monsters-as-anomalies account). As we shall see, this thesis runs into difficulties when we attempt to determine what it is precisely that makes an animal disturb a classification. We will see how this argument has been refashioned, chiefly by Dan Sperber and Scott Atran, into a claim that has more psychological plausibility (in section 1). Another proposal would replace intuitive classificatory categories (e.g., the difference between quadrupeds and fish) with intuitive ontological categories (e.g., living vs. nonliving; animate vs. inanimate). The view that entities enjoy high cognitive appeal if they transgress these ontological boundaries in one and only one way is deservedly famous in cognitive anthropology, but we will argue that this hypothesis does not apply well to monsters (section 2). A third answer to our two questions, the "monsters-as-predators" account, starts from the importance of predator detection to our past survival and reproduction and argues that predatory features make animals "good to think with," and should be overrepresented in monsters (". . . but predators have a hold on our imagination."). The last section ("Toward a unified hypothesis") sketches a theoretical framework that synthesizes ideas from the monsters-as-anomalies and monsters-as-predators accounts. There, we attempt to explain why the two most characteristic aspects of monsters, anomalousness and predatoriness, tend to be paired with one another.

Throughout this article, we use the phrases *imaginary animals* and *monsters* interchangeably, even though each carries different connotations. Imaginary animals are simply that—fictional creatures—while monsters are typically big and dangerous, in addition to being imaginary. The equivocation is deliberate. In the last part of our article, we will make the case that the link between fictionality and danger is not accidental: imaginary animals tend to be frightening, that is, they tend to be monstrous. We propose an account of this relationship: in other words, we hope to explain why monsters are dangerous.

1. Classificatory anomalies are not all good to think with . . .

In true structuralist fashion, Douglas ([1966] 2003) argued that the cultural and symbolic status of animals was determined by their position within a classification. Specifically, she claimed that Biblical dietary prohibitions target animals that are not typical of their kind and linked this to the symbolic status of classificatorily ambiguous animals in other cultures, most famously the Pangolin among the Lele of Congo. Douglas's specific proposal was heavily criticized (Lemardelé 2014; Sperber 1975; Walsh 2007; Lewis 1991), not least by Douglas herself (Douglas 2001), but the general notion that unclassifiable animals have particular cognitive appeal endures. This thesis provides a ready answer to our first question, What makes some animals good to think with? Answer: classificatory anomalies. If this is true, then such anomalies should be overrepresented among monsters. Are they?

On the face of it, they are. Imaginary animals do not merely stretch commonsense categories; they flaunt them (Sperber 1975). They look nothing like common or garden species. They tend toward the freakish and the monstrous. Imaginary animals typically possess traits that would make any real species stand out, including mutations like multiple limbs, a single eye, excessive size, and so on. More interestingly from the perspective of structuralist anthropologists, imaginary animals also fuse features belonging to phylogenetically distant species: eagle-headed lions, feathered humans, and the like.

A Douglasian way of viewing monsters still commands a lot of credibility in the humanities. Noel Carroll's *The Philosophy of Horror* (Carroll 1990), having cited Douglas, elaborates:

> Many monsters of the horror genre are interstitial and/or contradictory in terms of being both living and dead: ghosts, zombies, vampires, mummies, the Frankenstein monster, Melmoth the Wanderer, and so on. Near relatives to these are monstrous entities that conflate the animate and the inanimate: haunted houses, with malevolent wills of their own, robots, and the car in King's *Christine*. Also many monsters confound different species: werewolves, humanoid insects, humanoid reptiles, and the inhabitants of Dr. Moreau's island. (32)
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> . . . .
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> [Monsters] are un-natural relative to a culture's conceptual scheme of nature. They do not fit the scheme; they violate it. Thus, monsters are not only physically threatening; they are cognitively threatening. They are threats to common knowledge. (34)

This view of monsters as taxonomical anomalies is worth pondering for a moment. It seems intuitively right, but we should distinguish one sense

in which it is just trivially true, from a different, more substantive reading. The trivial claim is the following: any zoological classification meant for real-world animals is bound to ignore nonexistent creatures. Thus, in a trivial sense, imaginary creatures are classificatory anomalies simply because they are absent from the inventory of (real-world) animals. This is not much of an anomaly; the simple addition of a new category would resolve it.

Monsters may disrupt our classification of animals in a much more substantive way, by calling into question the coherence of major classificatory principles (if their existence is taken seriously). That kind of disruption could occur, for instance, if the monster in question presents features of two distant species supposed to belong to entirely distinct categories. This more substantive claim brings with it problems of its own, however. To know whether an animal violates or stretches the categories that a culture uses to classify animals, we need to figure out what these categories are. But not all cultures entertain a unified classification of species with the ambition of identifying natural kinds: folk classifications tend to be plastic and pluralistic, instead of rigidly systematic. They readily accept vague or overlapping categories (Sperber 1975).

Another challenge is in knowing how unlikely an animal has to be to count it as a classificatory anomaly. Many real-world species combine features from distant taxonomical categories without disrupting scientists or laypeople's classifications: dolphins and whales are mammals who live and look like fish, hippos have hairless skin like humans yet live in the water like fish, chimpanzees resemble humans without having language, and so on.

Last, one needs to demonstrate that the threat to the classification is effective and recognized as such. This is not always easy to do. To take but one example, Christian medieval theologians and zoologists accepted the existence of many outlandish monsters as fact and went on to find a place for them in God's harmonious creation in quite a relaxed way (Wittkower 1942).

In short, structuralist anthropology spoke of classificatory anomalies without putting forward any clear and shared criterion that researchers could use to distinguish the anomalous animals from the rest. Douglas's original claim was quite elastic, and subsequent proposals did nothing to make it tighter. Few sharp distinctions were drawn between animals with slightly atypical features (e.g., pigs do not physically resemble the ruminants with which they coexist), hybrids of two species (such as mules), mutants, sick animals, and imaginary monsters. This elasticity no doubt contributed to the hypothesis's success, but that same elasticity renders hybrids challenging to evaluate.

Today's cognitive anthropology is much better equipped to describe people's naive classifications of animals. Anthropologists like Scott Atran (1993) or Pascal Boyer (2001) focused their investigations on the universal building blocks of intuitive classifications. In contrast with standard ethnographic analyses that are typically tailor-made for the categories of a given culture, these theoreticians sought to develop hypotheses that were as general in scope as was possible. The resulting framework rests on the view that humans are natively prone to classifying things according to "folk theories." According to the framework, these folk theories are emphatically not the popular theories that hold among a particular group. They represent deep psychological constraints on human worldviews, producing cross-culturally robust and early-developing intuitions. One such intuition separates animate from inanimate beings (more on this below). Another posits that biological individuals have essential properties distinct from their accidental properties (folk biology), or precise expectations about the beliefs and desires of entities that are capable of those things (the so-called theory of mind). Even a cursory description of these theories would be beyond the scope of this article; but what do they have to say about anomalous animals?

First, folk classifications are plastic enough that taxonomical anomalies, properly speaking, rarely occur at all (Atran 1993: chap. 2). Most cultures inhabit an ecology where the distinction between species (e.g., sheep) and genera (e.g., Ovis) is irrelevant to most classificatory purposes. The family level (e.g., bovidae) is usually left implicit. The resulting classifications tend to be *flat* (our term). They tend to consist in categories that fuse the generic and the specific level without much superordinate elaboration, as opposed to the ramified family-genre-species taxonomies that biologists are accustomed to. Few zoological oddities are so extreme that a flat taxonomy cannot accommodate them simply by creating an ad-hoc category. In a flat system, such categories are nothing special. As Sperber (1975) and Atran (1993) argue, ad hoc categories are just as productive as other categories. In the land of the Dorzé of Ethiopia, only one species of snake is commonly known. Snakes in the Dorzé classification thus form a zoological singleton, but when a Dorzé travels to the Great Rift Valley where other species of snakes are known, the Dorzé classify them under the Dorzé category for snakes as a matter of course (Sperber 1975). This simple strategy also takes care of hybrids. The fact that donkeys and mares can interbreed constitutes a limited breach of these species' boundaries, but folk classifications (distinct on this point from scientific classifications) solve the problem simply by making mules into an ad hoc species, known to bridge its parent species and to consist of sterile individuals. Thus, contrary to what Doug-

las (and most of structuralist anthropology alongside her) claimed, classificatory anomalies do not explain why some animals lend themselves more readily to symbolic elaboration. Folk taxonomies are structured in such a way that serious anomalies are unlikely to arise and are easily solved.

This point invalidates the standard view of classificatory anomalies, and alongside it the power of anomalies to explain monsters. But it still leaves the door open for a revised version of this claim. In this revised version of the monsters-as-anomalies view, taxonomical boundaries are replaced with statistical regularities:

> The taxonomic position of bats, seals, whales, ostriches and the like, though logically speaking never anomalous, is nonetheless often psychologically peculiar. In some societies the bat is classified with the bird, in others with the quadruped, in yet others it is given a separate taxonomic status equal to that of the bird and the quadruped (...). But whatever taxonomic solution one opts for, the result is abnormality: if classified with the birds or quadrupeds, still it is morphologically and behaviorally distinct from the other birds or quadrupeds; and if given a position equal in status to that of the birds, quadrupeds and fish, still it lacks the numerical and ecological diversity of these other higher order taxa and constitutes a much more perceptually and behaviorally homogenenous taxon. This peculiarity is attention-getting. Hence it renders such kinds choice subjects for symbolic speculation (. . .) (cf. Sperber 1975). (Atran 1993: 118)

What Sperber and Atran proposed amounted to a substantial rethinking of Douglas's classificatory anomalies as prototypicality effects (Rosch 1978) whereby things that are perceived as belonging to a category might nonetheless occupy a marginal position within that category (e.g., ostriches and penguins compared to sparrows). Atypical animals may be cognitively appealing for the same reasons that novel or incongruous notions are easier to recall: they stand out (see, e.g., Waddill and McDaniel 1998; see Purzycki and Willard 2015 for an overview). Having advanced this proposition, Atran went on to cite numerous examples of animals that are atypical but not more symbolically or cognitively important for being so (e.g., armadillos among the Tzeltal of Mexico). In the same vein, Sperber also notes the lack of clear evidence that mutants or hybrids per se are considered repulsive. The beliefs and taboos that apply to mules in most cultures do not seem (prima facie) more negative or restrictive than those associated with donkeys. We might add that more unusual hybrids, like geeps (a cross between a goat and a sheep), sometimes occur naturally and have been known to naturalists for centuries, yet neither religion nor folklore afford them particular interest.

Counterexamples only go so far, and the claim that unusual animals are good to think with could still be true on average. Demonstrating the truth

of this claim properly would be a research program in itself, but, instead of pursuing it, cognitive anthropologists took a different direction.

2 . . . and many monsters are not "minimally counterintuitive" . . .

Ontological anomalies, like talking animals, shape-shifters, or immaterial creatures, threaten not just the classification of animals but also the basic boundaries that separate animals from other types of things: objects, plants, humans, or divinities. Shape-shifters like werewolves are not just biologically atypical. They transgress our basic expectations about nature, like the intuitive divide between animals and humans, or the fact that a creature should not be able to shift between these two categories. A particularly influential hypothesis holds that the most appealing cultural inventions make use of one and only one violation of our ontological intuitions (Boyer 2001; Norenzayan et al. 2006; but see Purzycki and Willard 2015). Dr. Frankenstein's creature is not a human but an artifact (a major ontological violation); otherwise, it behaves and thinks like a normal person would. In technical parlance, the creature is "minimally counterintuitive."

What counts as an ontological violation in this framework depends on very specific hypotheses about human cognition, drawn from developmental psychology. Because of this difficulty, the *minimal counterintuitiveness* hypothesis cannot be used to explain the cultural success of bizarre creatures that do not, for all their weirdness, breach any ontological boundaries. Many animals of the medieval bestiary qualify, for instance. Some, like griffins or unicorns, are essentially composite animals fusing several species' attributes. Others are real animals endowed with implausible faculties: stags can live for a thousand years; weasel females give birth through their ears; ostriches can ingest anything at all, and so on (Pastoureau 2011). Medieval bestiaries also feature properly supernatural creatures, but (here as in other compendia of imaginary beasts) the supernatural element arguably is not the main attraction.

The popularity of such animals suggests that entities can be cognitively appealing and culturally successful without being minimally counterintuitive (Purzycki and Willard 2015). Despite this, the minimal counterintuitiveness hypothesis has occasionally been taken, by proponents and adversaries alike, as relevant to explaining the cultural success of monsters. For instance, David Wengrow's influential study of monstrous imagery in the Bronze Age (Wengrow 2013) uses this hypothesis (in Boyer's [2001] version) as its main theoretical target, even though the book dwells on "composite" animals that fuse body parts from several different species. Composites are strange animals that often violate zoological classi-

fications (although, as we just saw, the violation may not be obvious), but they are not counterintuitive in the technical sense of the term (Boyer 2001; Norenzayan et al. 2006; Purzycki and Willard 2015): composites as such do not flaunt our basic expectations about animals as distinct from objects or humans.

Addressing this point, Boyer (2001: 80 ff.) retorts that strange animals such as unicorns, dragons, or satyrs, are seldom merely strange. Usually, they are also thought to possess features that are counterintuitive in the strong, technical sense defined by cognitive scientists: unicorns can only be seen by virgins; Greek man-goat forest spirits appear or disappear at will; many dragons are divinities with cosmological powers, and so on. This claim sounds plausible but raises at least three analytical concerns. First, people could simply invent counterintuitive creatures and leave it at that: a horse that only virgins can see, a goat that can appear or disappear at will, a cosmic deity, and the like. Why do we need to turn these entities into weird animals, on top of their counterintuitive features? This suggests a specific appeal for anomalous animals, which the minimal counterintuitiveness hypothesis does not account for. (To be fair, making sense of the appeal of anomalous animals is not the purpose of the hypothesis.) Second, one can doubt whether most fantastic creatures are minimally counterintuitive, rather than maximally so. Some depart from intuitive expectations in more than one way. Shape-shifters, for instance, are seldom just shape-shifters: shamans in many cultures can turn into animals but have many other supernatural features (Singh 2017). Western literary vampires (like Stoker's Dracula) can turn into bats, but they are also immortal, and unreflected by mirrors. Last, critics of the minimal counterintuitiveness hypothesis (e.g., Purzycki and Willard 2015) have pointed out that literature does not always maintain a clear distinction between minimally counterintuitive concepts and merely strange ones.

In summary, Boyer's hypothesis concerning the cognitive appeal of minimally counterintuitive concepts was not intended to explain the puzzling features of imaginary animals, and we should not expect it to do so.

3. . . . but predators have a hold on our imagination

A look through any inventory of imaginary creatures (e.g., Weinstock 2014; Borges 1957) reveals many dangerous predators. Most real animals pose no danger to humans, but many imaginary ones do. Danger, in fact, seems to answer the first and the second question of our introduction: it is a feature that makes animals good to think with, and it is also particularly pronounced in imaginary animals.

Are dangerous animals "good to think with"? In short, yes. The reasons for this are theoretical as well as empirical.

Evolutionary psychologists have long held that humans should have inherited from our primate ancestors learning mechanisms that are biased toward the rapid and accurate detection of predators (Guthrie 1995; Öhman and Mineka 2001; Barrett 2015). This does *not* mean humans are born with an innate fear of snakes or spiders; it means that our plastic learning mechanisms are better at learning to recognize stimuli associated with the presence of predators. The rationale for this view is twofold. First, animate beings were, on average, much more useful for a primate to learn about, compared to inanimate beings, given that many animals are potential prey, predators, or conspecifics (New, Cosmides, and Tooby 2007). Second, predators raise a specific challenge for cognition. The costs of failing to recognize a predator are much higher than the costs of failing to recognize a conspecific or a prey (Barrett and Broesch 2012). Primates should thus have evolved learning mechanisms with a lower threshold for predator recognition.

Relevant evidence for each of these two assumptions has been gathered over the past two decades by scholars of primatology, developmental psychology, and comparative psychology. As is often the case, the data is most abundant on Western human adults. Adults from industrialized countries stand as an interesting case in this instance, given that most live in environments where animal predators are no longer a threat: opportunities to learn about predatory danger firsthand are thus limited. The general picture that emerges seems to support the view that predators are cognitively appealing, even though some issues remain moot. Studies show a general bias for the detection and recall of animal shapes in primate and human adults (New, Cosmides, and Tooby 2007; Schussler and Olzak 2008; Calvillo and Jackson 2014; Altman et al. 2016; Guerrero and Calvillo 2016; but see Hagen and Laeng 2017). Evidence for a specific sensitivity to predatory animals is abundant but also disputed. In a series of papers published in the 1970s (summarized in Öhman and Mineka 2001), Arne Öhman, Susan Mineka, and their colleagues showed enhanced cognitive and physiological sensitivity to pictures of snakes and spiders, compared to pictures of mushrooms or flowers. These results elegantly complemented a series of experiments with primates, showing faster individual and social learning for the recognition of predatory animals compared to nonpredatory animals or plants. But the scholars' choice of stimuli for the human studies did not include nonpredatory animals, preventing them from ruling out the possibility that their participants showed a general sensitivity to animals, rather than to predators per se. Current research is trying

to tease these potential effects apart. Although heightened sensitivity to threat-related stimuli (not just snakes or spiders but guns, syringes, etc.) is well established, it is still unclear whether evolutionary ancient threats are prioritized over recent ones (like guns or syringes).[1] A possible *specific* bias for snakes, probably humankind's most important multicellular predator, is also quite heavily debated (Coelho et al. 2019).

Parallel to this work, Clark Barrett and his team led a series of cross-cultural studies showing that verbal information concerning animals and plants is better retained by children when it concerns dangerousness, as opposed to other ecologically relevant traits (e.g., habitat or diet) (Barrett and Broesch 2012; Barrett, Peterson, and Frankenhuis 2016; Broesch, Barrett, and Henrich 2014). Although quite different in method from the visual recognition literature, Barrett's work tests the same basic idea: danger-related information enjoys a cognitive premium due to the high costs of ignoring it.

In short, there is strong evidence that animal predators are good to think with, since they combine two highly relevant features, animacy and danger. Are imaginary animals more dangerous than real ones? Our knowledge on this second point is far less systematic or generalizable, but there does appear to be a general scholarly consensus. We are not, of course, the first to remark that monsters are dangerous (Carroll 1990; Clasen 2014; Hanich 2011). Specifically, if the monsters-as-predators account is right, monsters should not be simply dangerous, but dangerous in the specific ways that animal predators are to humans. And, indeed, a typical monster does not carry infectious diseases, does not entrap its target, does not manipulate or betray them. It attacks its targets directly in close combat. As Hanich notes, "We are frightened by the sheer presence of the monster either because it reminds us forcefully of an act of violence we have already witnessed or have inferred from the plot; or because it points toward an impending cruelty indicated by the monster's aggressive behavior and/or dangerous appearance" (Hanich 2011: 83). This notion—that monsters are dangerous not in a generic but in a specifically predatory way—is important for two reasons. First, because this idea stands in contrast with the view that biological anomalies should elicit disgust or nonspecific feelings of danger (Douglas [1966] 2003; Wagner et al. 2010). Second, because this concept indicates something broader about the cognitive appeal of fiction. In a previous article (Morin, Acerbi, and Sobchuk 2019), we proposed that fictional dangers could be sorted into two types: mere threats, and ordeals.

1. See Blanchette 2006; Freeman 2012; Zsido, Deak, and Bernath 2019 for evidence against this; Penkunas and Coss 2013 for evidence in the opposite direction.

Mere threats are the kind of danger for which we can best prepare by taking precautions in the real world. When a danger is rare, serious, and avoidable, it constitutes an ordeal. Ordeals are dangers that are best anticipated by simulating them through training, plays, or stories. Real experience of the danger does not prepare us for it (because it is rare), but faking such an experience might. Play and fiction arguably share relationships with an evolved propensity to simulate ordeals. Encountering a ferocious predator is a typical ordeal: an event too rare and dangerous for us to prepare for it by direct practice, but which can be faced as simulations. We thus expected ordeals to be much more common in fiction compared to real life. We compared fictional death counts in fiction to real statistics. In keeping with our hypothesis, we found in a sample of novels that fictional characters are vastly more likely not just to die but to be killed by an agent. Killings by animal- or monster-predators were particularly overrepresented.

This account predicts that the inventors of imaginary animals will likely exaggerate all the features that can make them good predators (as remarked in Clasen 2014). Providing these imaginary animals with natural weapons (like horns, claws, sharp teeth, beaks, flailing tails, etc.) is one obvious means of exaggeration. Increased size is another. All these qualities are abundantly present in imaginary animals, many of which are modeled after apex predators dangerous to humans (like wolves or snakes). Sometimes the single addition of a natural weapon is enough to define an imaginary animal. (A typical unicorn is a horse with one natural weapon added; early unicorns were goats with one super-sized horn.) Size is almost systematically exaggerated upward, seldom downward (who ever heard of the Tiny, Tiny Wolf?). Some other adaptations of real-world predators are not as frequently and self-evidently found in their imaginary counterparts, however. These include cognitive adaptations, ranging from forward-facing eyes to greater intelligence; chemical weapons such as venom; and motor adaptations, like stealth. Conversely, some customary features of monsters are not specific to predators: wings and extra limbs can serve to move faster on a prey but are equally useful to elude attackers.

This account of imaginary animals gives us no particular reason to expect monsters to be classificatorily ambiguous—to bridge major divides between animal families. This may or may not be a lacuna. Some imaginary animals, like giant spiders or unicorns, do not seem to cross any species divide; they are merely regular animals with added predatory features, or predators on steroids. Yet most monsters (judging, e.g., by Weinstock's inventory) do seem to scramble our classifications in egregious ways. Others, like cyclops or Cerberus, do not straddle classificatory divides, but

they are anomalous in ways that violate our expectations about a species' identity.

Thus, the two most promising accounts we examined so far, the monsters-as-anomalies hypothesis and the monsters-as-predators account, each seem to hold a piece of the puzzle, but also to miss a crucial part of the phenomenon—which the other theory explains. To reconcile the two, we need an account that explains why these two key properties, anomaly and danger, happen to coincide within imaginary animals.

4. Toward a Unified Hypothesis

The easiest way to explain the coincidence of anomaly and danger would be to start from Douglas's claim that anomalous animals create unease because they upset what is felt to be a natural ordering of the world (see also Leach 1989). Some support for this view comes from recent studies investigating negative attitudes toward genetically engineered organisms (GMOs/GEOs) (Blancke et al. 2015; Kronberger, Wagner, and Nagata 2014; Wagner et al. 2010). Transgenic GMOs, which combine the genes of two different species, are generally judged more negatively compared to cisgenic GMOs, in which artificially combined genes come from two individuals who could naturally interbreed. If creatures that bridge species boundaries elicit negative attitudes, this could explain why imaginary animals tend to be monstrous, that is, to carry the features of fearsome predators.

Such an account, though superficially appealing, runs into several obstacles. We already encountered two of them: the general difficulty of reconstructing folk classifications and the fact that many classificatory systems are structured in such a way that they avoid anomalies altogether. As we saw in the first section, the revisions proposed by cognitive anthropologists go some way toward addressing these issues. Two additional problems are matters of psychological plausibility.

First, there is little evidence for the *general* claim that hard-to-classify entities per se provoke disgust or fear—nor would it make much sense for human cognition to be afraid of anything it cannot unambiguously classify. A link between ambiguity and fear or disgust enjoys some currency in GEO studies, as we saw, or in engineering (the famous "uncanny valley" hypothesis: Mori, MacDorman, and Kageki 2012). But can this link be generalized? As far as we know, ambiguous colors that are difficult to name evoke no particular disgust or fear. Neither did things that for a long time were classificatory anomalies, like mercury (a metal that is also a liquid), planets (celestial bodies that shine permanently like stars but move

around like comets), corals (halfway between the living and the mineral realms), or, for that matter, saxophones (hybrids of trumpets and oboes). Leap years are an irregularity in our calendar, yet no strong superstition attaches to them.

Second, the monsters-as-anomalies account predicts the wrong emotional reaction to monsters: disgust, or some nonspecific negative reaction, rather than fear. The original purpose of Douglas's account was to explain sacrality and food taboos; it was adapted more recently to apply to GMOs. In both cases classificatory anomalies are supposed to be linked to disgust, or to nondescript negative affect. But monsters are fear inducing rather than disgusting, and food taboos are not usually central in the mythologies surrounding them.

These two problems can be tackled by appealing to evolutionary psychology. There is a good evolutionary rationale for being wary of unknown biological entities (plants or animals). As we saw when discussing predators, there is a cost asymmetry to the identification of dangerous animals and plants. The costs of misidentifying a toxic plant or a predator are higher than the opposite mistake—mistaking an innocuous plant for a toxic one, for instance. The way we detect living things should be sensitive to this asymmetry and extend dangerous categorizations more liberally (Guthrie 1995; Barrett 2015). Extending this reasoning to cases where no category is applicable, the default expectation should be that one is facing a dangerous entity.

The kind of danger that one anticipates should differ between animals and plants. This distinction, we would suggest, is the key to understanding why ambiguous categorization creates different reactions to plants and to animals. The chief hazard linked to plants is their toxicity, which varies greatly from one species to the next, not always in easily detectable ways (Wertz and Wynn 2014). The toxicity of animals is quite a different matter. Badly preserved meat or fish is quite hazardous, but the key factor here are the conditions of preservation, not the particular species that one is eating (exceptions being made for some kinds of seafood). Predatoriness, by contrast, varies quite a lot from one animal species to the next (and is not relevant for plants). Thus, ambiguous plants should be avoided because of their possible toxicity: they should elicit disgust. Ambiguous animals, on the other hand, are not (pace Douglas) particularly disgusting. Instead, they should be feared as possible predators.

This account appears to solve the two problems we identified. It is specific to biological entities, predicting no general aversion for taxonomical or statistical oddities; and it predicts the right emotional reaction: monstrous animals are dangerous as predators, not as food, and the proper

reaction to them is fear, not disgust. If correct, this account would link the two characteristic features of monsters: their incongruity and their dangerousness. It would do so without circularity (claiming that monsters are dangerous because we fear strange creatures), and without making excessive claims about human cognition (e.g., that any categorical anomaly is a cause for distress).

5. Conclusion

We started with a challenge: find one or several things that make real animals cognitively appealing and see if those things could be found in imaginary animals. The literature contains several answers that make superficial sense but fail to account for important aspects of the problem. The first account—monsters as anomalies—would face serious objections from students of ethno-biological classifications, but it seems to capture something important about monsters—their incongruousness. The minimal counterintuitiveness hypothesis was never really meant to be applied to imaginary animals (except for a few authors). The monsters-as-predators account, perhaps the most promising of the three, leaves out the fact that most monsters are egregiously strange, not simply big and ferocious. We suggested a way to synthesize the anomalies account and the predators account, building on the strengths of each to explain why anomalous animals are associated with danger, danger and anomalousness being each cognitively appealing for different reasons.

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