THE IMAGINATION BETWEEN THE NATURAL SCIENCES AND FICTION: A HUMEAN PERSPECTIVE

A IMAGINAÇÃO ENTRE AS CIÊNCIAS NATURAIS E FICÇÃO: UMA PERSPECTIVA HUMEANA

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Abstract:

According to David Hume the imagination is a mental faculty that forms, unites and separates ideas. This creative character puts it in a position to play a major role not only in fiction — once it's due to the imagination that we conceive fantastic creatures like dragons and winged horses —, but also in the natural sciences — once it's due to the imagination that we suppose that the course of nature remains the same through time. My objectives in this paper are to introduce the vocabulary that Hume elaborated in the *Treatise of Human Nature* and argue that the imagination operates by irregular and regular principles, culminating in the generation of beliefs that have a negative and positive epistemic status, respectively.

Keywords: David Hume, Imagination, Natural Sciences, Fiction

Resumo: *De acordo com David Hume a imaginação é uma faculdade mental que forma, une e separa ideias. Esse caráter criativo a coloca em uma posição central não apenas na ficção — pois é em função da imaginação que concebemos criaturas fantásticas como dragões e cavalos alados —, mas também nas ciências naturais — pois é em função dela que supomos que o curso da natureza permanece o mesmo no decorrer do tempo. Meus objetivos neste artigo são os de introduzir o vocabulário que Hume elaborou no Tratado da Natureza Humana e argumentar que a imaginação opera por princípios irregulares e regulares, culminando na geração de crenças que possuem um status epistêmico negativo e positivo, respectivamente.*

Palavras-chave: *David Hume, Imaginação, Ciências Naturais, Ficção*

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Introduction

Imagining is one of the most important activities of the human mind. It's usually acknowledged both in the philosophical community and in folk psychology that it's due to the imagination that authors of fiction are able to fancy and write stories about entities like dragons and winged horses, and thus create worlds of fantasy that are a major part of our culture[1]. So without the imagination — and its power to make us entertain thoughts that are directed towards objects that aren't immediately prompted by sense experience — we wouldn't have had the development of fiction, which means that works of literature, cinema, theater and the arts in general mightn't have come into existence, at least not in the same way we know them in the actual world.

But there's more to the imagination than dealing with fantastic creatures. The natural sciences, for instance, also rely on the imagination. It's due to this faculty that scientists are in a position to conduct researches in what we nowadays call physics, chemistry and biology, once it's in virtue of the fancy that we presuppose that the course of nature is uniform through time and that the same causal relations that occurred in the past are necessarily going to be held in an analogous fashion in the future. Even though these conceptions are imaginary, they have nothing to do with fiction. By the contrary: they're the building blocks of the so-called "sense of reality".

But how is it possible? How can one and the same mental faculty on the one hand be the main responsible for the creation of fictional stories, and on the other hand be one of the essential features for the development of the natural sciences and for the establishment of a sense of reality? What are the criteria we must put forward in order to explain why the former group of ideas has a negative while the latter has a positive epistemic status? And what is this faculty called "imagination", after all? David Hume was certainly one of the most insightful philosophers of all time and this is the reason why I intend to answer the questions I raised above by considering the account he articulated in the first book of the *Treatise of Human Nature*[2].

[1] As Amie Thomasson argues: "taking authors to be genuinely creative as they make up fictional characters is central to our ordinary understanding of fiction" (THOMASSON, 1999, p. 6).

[2] I used *A Treatise of Human Nature: A Critical Edition* edited by David Fate Norton and Mary Norton (2007) and the references stand traditionally for Treatise. Book. Part. Section. Paragraph (T. 1.1.1.1).

1. General remarks on Hume's theory of mind

Before delving into Hume's account on the imagination it's crucial to take a few moments to recap his theory of mind and introduce the basic vocabulary for our discussion. With that being said, in this section I'm going to advance the notions of *perception, impression* and *idea*, explain how they can be further classified as *simple* or *complex*, and finally characterize the general lines of the *copy principle*.

According to Hume the human mind is constituted by *perceptions*, and they can be distinguished as *impressions* or *ideas*. Although impressions and ideas have the same nature — both qualify as perceptions —, they differ in the degrees of force and liveliness with which they strike one's mind: the impressions are more forceful and violent and constitute our sensations, passions and emotions in their first appearance; while the ideas are faint and low and constitute images that resemble directly or indirectly those previous impressions. As Hume says: "That idea of red, which we form in the dark, and that impression, which strikes our eyes in sunshine, differ only in degree, not in nature." (HUME, 2007, T. 1.1.1.5, p. 8). He holds that the distinction between impressions and ideas is intuitive because anyone is capable of noticing the existing contrast between feeling (impression) and thinking (idea)[3].

These perceptions — both impressions and ideas — can be further classified as *simple* or *complex*. The simple perceptions are those that can't be separated any longer and thus could be said to be a sort of "perceptual atom"; while the complex perceptions are those that have at least two embedded attributes and therefore can be detached or broken down into simpler parts. For example, an apple might be experienced as having a myriad of colors, tastes and smells — a complex perception — but once one focuses on, say, the red color of the apple and isn't able to separate the darker from the lighter shades of red (because it turned out to be a totally unified experience) then one has found a simple perception (idem, 2007, T. 1.1.1.2, p. 7).

Impressions and ideas are usually tied together and their resemblance and contiguity suggest that they're correlated. But given that correlation doesn't imply causation, Hume presents two counterfactual arguments in order to discover which of

[3] Even though impressions and ideas might be barely distinguishable in the cases of sleep, fever or madness once under these circumstances the ideas are vivacious (HUME, 2007, T. 1.1.1.1, p. 7).

these perceptions is prior to the other. First, it's impossible for one to entertain any original idea without a previous corresponding impression. For example, someone who has never had a slice of pineapple is incapable of having an idea of the taste of that fruit; or a person who was born deaf is unable to think about the sound of the notes produced by the bassoons in Beethoven's 9th Symphony. Second, an idea always follows from an impression but an impression doesn't follow from an idea. For example, when one sees raindrops falling from the clouds in the sky, one can have the idea that it's raining; but when one has the idea that it's raining it doesn't follow that one is seeing that raindrops are falling from the clouds in the sky. Accordingly, *impressions are prior to and cause these ideas* (HUME, 2007, T. 1.1.1.8-9, p. 9).

However, Hume is aware that if "every idea corresponds to an impression" were a general maxim, it would be a false one. I can imagine dragons or winged horses even though I've never seen, touched or smelled (and probably will never have the chance to see, touch or smell) any of these creatures. The idea of a dragon is complex: one could easily distinguish and separate the qualities of having wings and claws, being green, spitting fire through the mouth and nostrils, etc. Hence not every complex idea corresponds *directly* to an impression[4]. But what about *simple* ideas? Hume argues that *every simple idea is a perfect copy of a simple impression*, and given that he thinks nobody can counter this general maxim[5] he establishes that

> The *full* examination of this question is the subject of the present treatise; and therefore we shall here content ourselves with establishing one general proposition, *that all our simple ideas in their first appearance are deriv'd from simple impressions, which are correspondent to them, and which they exactly represent*. (idem, 2007, T. 1.1.1.7, p. 9).

[4] Some complex ideas might correspond directly to a complex impression. For example, the idea of the apple I ate a couple of minutes ago could be said to be a copy of the impression I had when I tasted it. Nonetheless, I could also imagine that that apple was sour, bitter or salty instead of sweet and in this case the idea wouldn't have been a perfect copy of the previous complex impression.

[5] Hume acknowledges that there's an exception to this maxim and such an exception turned out to be known as *the missing shade of blue*. Let's say a given person is familiar with every shade of blue but one. This person then sees a great variety of shades of blue, from the lightest to the darkest tones, and that somewhere in between there's a blank spot that corresponds to the only shade of blue one isn't familiar with. Hume argues that the person from the example might conceive that missing shade through his imagination. This is the sole case in which a *simple* idea isn't a perfect copy of a *simple* impression, "tho' the instance is so particular and singular, that 'tis scarce worth our observing, and does not merit that for it alone we shou'd alter our general maxim." (HUME, 2007, T 1.1.1.10, p. 10).

The quotation above expresses what the commentators nowadays call Hume's *copy principle*[6]. But a question was left unanswered: if every simple idea is a perfect copy of a simple impression, how are we able to entertain complex ideas (like the idea of a green dragon) if one has never had a prior corresponding complex impression of that object? The answer resides in the capacities of the imagination to associate and rearrange ideas.

2. Hume on imagination

According to Hume the imagination might be regarded as "the ultimate judge of all systems of philosophy" (HUME, 2007, T. 1.4.4.1, p. 148) and he also holds as a fact that "men are mightly govern'd by the imagination" (idem, T. 3.2.7.2, p. 342), which shows that this mental faculty plays a major role in his own philosophical inquiries. But what is the imagination after all? There are three ways to sketch a definition of "imagination"[7]: (1) in opposition to memory; (2) in opposition to reason and (3) in a general perspective[8]. Let's begin this investigation with the relations of opposition, taking into account what is perhaps the most elucidating passage in the *Treatise*:

> By this expression it appears that the word, imagination, is commonly used in two different senses; and though nothing be more contrary to true philosophy, than this inaccuracy, yet in the following reasonings I have often been obliged to fall into it. When I oppose the imagination to the memory, I mean the faculty, by which we form our fainter ideas. When I oppose it to reason, I mean the same faculty, excluding only our demonstrative and probable

[6] It might be interesting to recall that Fabian Dorsch (2016, p. 42) infers from the copy principle that there are three relations between simple impressions and simple ideas:

(I) *Correspondence*: simple impressions and simple ideas share the same mental content;

(II) *Causality*: simple impressions cause simple ideas;

(III) *Asymmetry*: simple ideas don't cause simple impressions.

[7] This is why Norman Kemp Smith (2005, p. 459) affirms that according to Hume there aren't only two or three different *senses* for the word "imagination", but that there are two different *faculties*: an imagination that is responsible for feigning and another imagination that is responsible for apprehending real things. I hold that this analysis is mistaken when we consider what Hume says in T. 1.3.9.19. FN 7, p. 81.

[8] Hopkins (1998, p. 110) argues that there are differences between the imagination, memory and reason, but we could also establish three distinctions between the imagination and the impressions:
(a) *Immediacy*: impressions are always constituted by objects that are present in the actual environment, while ideas can be about objects that are either close (e.g., right behind him) or far from the perceiver;
(b) *Belief*: impressions are so lively and strong that one normally believes what he sees (hears, touches, etc.), but one may have a variety of ideas in which he doesn't believe (e.g., the idea of a green dragon);
(c) *Voluntary agency*: one can entertain a thought about a given object (like a red apple) whenever he wishes; but one can only have an impression of an object when it is immediately present to the senses.

> reasonings. When I oppose it to neither, it is indifferent whether it be taken in the larger or more limited sense, or at least the context will sufficiently explain the meaning. (HUME, 2007, T. 1.3.9.19. FN 7, p. 81).

(1) So there's an opposition between imagination and memory[9]. According to Hume the memory is responsible for preserving the liveliness, order and position of the impressions as they occur in time (idem, T. 1.1.3.3, p. 12). The preservation of liveliness is important because a lively idea is frequently associated with belief: "an opinion, therefore, or belief may be most accurately defin'd, *a lively idea related to or associated with a present impression*" (idem, T. 1.3.7.5, p. 67). For example, I don't doubt that right now there's a laptop, a sketch notebook and a black pen in front of me because I'm seeing and touching these objects — and impressions are vivacious by definition. Accordingly, one of the functions of memory is to make one believe that what has happened to him in the past has *really* happened. For example, I don't doubt that yesterday the same laptop, sketch notebook and black pen were in front of me while I was writing this paper because these ideas are also vivacious. If these ideas were faint I would wonder if this scenario really happened or if it was a dream or a hallucination. In this sense, the ideas of memory are close to the impressions and one can't be said to remember something he hasn't experienced in the past[10].

At any rate, the chief operation of memory is to retain the order and position of past impressions. It's because of memory that one is able to notice that he was a child *before* he turned into an adult and not the other way around. It's because of memory that one is able to distinguish that there was smoke *after* there was fire and not the other way around. Memory therefore organizes past experiences and has an important role in the conception of personal identity and causal relations:

> As memory alone acquaints us with the continuance and extent of this succession of perceptions, 'tis to be consider'd, upon that account chiefly, as the source of personal identity.

[9] The fact that Hume doesn't provide a clear defining for the terms "faculty", "imagination", "memory" and "reason" leaves the commentators in the dark. But Hume has a motive for being unclear. According to him the mind is neither a material thing nor a substance, so the mental faculties aren't things that can be singled out and have clear identity conditions. Hume has only identified some of the functions of the mind and attributed a name for each group of functions. For the function of associating ideas he called "imagination", for the function of preserving the order and position of the ideas he called "memory" and for the function of making demonstrative and probable reasonings he called "reason". However, these faculties may overlap and a particular idea might have been generated by all these faculties at once.

[10] Such an event might be said to be a "false memory". However, one shouldn't say that a "false memory" is actually a memory, but a lively idea that was introduced by the imagination and was mistakenly taken as an idea retained by memory due to its high degree of vivacity.

> Had we no memory, we never shou'd have any notion of causation, nor consequently of that chain of causes and effects, which constitute our self or person. (HUME, 2007, T. 1.4.7.20, p. 170).

In an explicit contrast to memory, "the imagination is not restrain'd to the same order and form with the original impressions" (idem T. 1.1.3.2, p. 12), and it's due to "*the liberty of the imagination to transpose and change its ideas*" (idem, T. 1.1.3.4, p. 12) that one might say that "nothing is more free than that faculty" (idem, T. 1.1.4.1, p. 12). The imagination "when set into any train of thinking is apt to continue, even when its object fails it, and like a galley put in motion by the oars, carries on its course without any new impulse" (idem, T. 1.4.2.22, p. 132). Even though it's the case that the faculty of imagination has a liberty that the faculty of memory lacks, it doesn't operate at random, but according to three general principles of association: resemblance, contiguity in time or place, and cause and effect (idem, T. 1.1.4.1, p. 12). These principles of association are "a gentle force, which commonly prevails" (idem, T. 1.1.4.1, p. 12) and are performed either consciously or unconsciously.

Let's analyze the three principles of association. The imagination associates ideas by *resemblance* when a current perception is compared to a previous idea that share some qualities with that perception. For example, when we look at the sky and see a cloud that looks like a sheep, we're imagining that an aerosol has something in common with a ruminant mammal — e.g., the material form. Although they belong to wholly different categories and one can't say that a cloud is a sheep, the imagination associates the sheep's form and the cloud's form and generates a sheep-cloud idea.

The second kind of association is *contiguity in time or place*. The imagination associates ideas by contiguity when a current perception of an object that isn't being observed from every perspective is prolonged and has its "gaps" filled. For example, imagine there's an elephant taking a bath in a lake, but that all you can see is its head. From that impression (given that you've already seen the body of an elephant before) the imagination can associate by contiguity in place that the elephant isn't just a floating head, but that it also has a body. Now imagine that the same elephant has finished taking a bath and is progressively leaving the lake. The imagination associates ideas by contiguity in time and (even if you don't have the impression that the elephant is out of the water) you may assume that the animal won't have any interruptions and will be completely out of

the lake in a few seconds. Therefore, the imagination fills these gaps when it associates ideas by contiguity in time or place.

The last type of association is *cause and effect*. The imagination might infer an effect that wasn't experienced from a cause that was either experienced or not. Let's say someone fell on the ground while playing soccer in a field made of concrete. The imagination may immediately infer from the impression of seeing someone falling on the ground (cause) that now that person has a bruised knee (effect). The association also works the other way around, so one might infer a cause that wasn't experienced from an effect that was either experienced or not. Let's say someone saw a smoke trail in the middle of a forest. From the impression of seeing smoke (effect) the imagination may infer that there's a bonfire (cause) in the forest. However, given that the imagination is free to wander around, one can also imagine from seeing a smoke trail that there's a dragon spitting fire in the forest. There's a difference between inferring that there's a bonfire or a dragon from seeing smoke in the forest, but they were both made by the same kind of association.

This is the full account on the principles of association when it comes to the *Treatise of Human Nature*, but Hume adds four more capacities to the imagination in the *Enquiry Concerning Human Understanding*: "[...] to compose, transpose, augment or diminish the materials that sense and experience provide us with" (HUME, 1998, p. 8). We're able to entertain the complex idea of a green dragon, for example, because we *compose* the ideas of a green lizard, a flying animal and flames; we can think about a virtuous horse because we *transpose* the property of being virtuous (which should only be attributed to human beings) to the idea of a horse; we're in a position to conceive of a human being that is 10 feet tall or 0.1 feet tall because the imagination may *augment* or *diminish* the same idea, respectively. A sane person would never believe that green dragons or humans that are 10 or 0.1 feet tall are entities that are in space and time because these ideas are faint and low and, as I'm going to argue in the next section, are not in accordance to experience and thus could be said to be generated by the irregular principles of the imagination.

So the imagination, *when it is defined in opposition to memory*, is the faculty that associates ideas by resemblance, contiguity in time and place and cause and effect. As a result, the ideas produced by the imagination are usually languid and aren't related to

belief. However, that doesn't mean the imagination can't generate lively ideas or belief (for example, I can believe that someone who has fallen on the ground has a bruise on his knee), but only that Hume is stressing these features when the imagination is taken in opposition to memory. It's also important to notice that though the imagination generates complex ideas that don't directly correspond to complex impressions, the materials that are used by this mental faculty are exactly the same as those that are used by memory, which means that they could be traced back to simple impressions and simple ideas — thus the copy principle stands still.

(2) There's also an opposition between imagination and reason. Let's recall the definition: "When I oppose it to reason, I mean the same faculty, excluding only our demonstrative and probable reasonings" (HUME, 2007, T. 1.3.9.19. FN 7, p. 81).

First we need to understand Hume's conception of "reasoning", which consists in "nothing but a comparison, and a discovery of those relations, either constant or inconstant which two or more objects bear to each other" (idem, T. 1.3.2.2, p. 52). The comparisons made between two ideas are the *relations of ideas*, while the comparisons made between an idea and an impression are *matters of fact*, and the comparisons of two impressions aren't a kind of reasoning but a sensation. We reason demonstratively when it's impossible to entertain an opposition between the ideas[11]. For example, one can't conceive a square that has three sides (because it wouldn't be a square, but a triangle) or a mountain without a valley (because it wouldn't be a mountain, but a flat land) once the concepts of "square" and "mountain" are *necessarily* conjoined with the properties of having four sides and of being a landform that rises above the surrounding land in a limited area, respectively.

Contrary to demonstrative reasonings, probable reasonings don't express necessities, but contingencies *under a determined scope of possibilities*. Let's think about a traditional die that has six sides. (By "traditional" I only mean that the die from the example is a cube with each of its six faces marked with a particular and non-repeatable number of dots from one to six. In sum, there are no flaws or tricks with the die we're referring to). If someone rolls the die, it is just probable that the face marked with the number 1 is going to be on top (16.6% of chance, to be precise). And given this is a

[11] According to Hume, "To form a clear idea of any thing, is an undeniable argument for its possibility, and is alone a refutation of any pretended demonstration against it." (HUME, 2007, T. 1.3.6.5, p. 62).

regular die with six sides, the chance for the face marked with the number 7 to be on top is 0%, meaning that is plainly impossible.

When it comes to the imagination, there's a maxim in metaphysics that says:

> *Whatever the mind clearly conceives include the idea of possible existence*, or in other words, *that nothing we imagine is absolutely impossible*. We can form the idea of a golden mountain, and from thence conclude that such a mountain may actually exist. We can form no idea of a mountain without a valley, and therefore regard it as impossible. (HUME, 2007, T. 1. 2.2.8, p. 26).

The imagination isn't restrained to necessities or scopes of possibilities. Think again about the die from the example above. One can conceive that the same die was cast up in the air, but that the resulting number on the face on the top was 7. It may seem nomologically impossible (according to the best laws of physics), but it is logically possible once such a scenario is conceivable. Then the imagination, when defined in opposition to reason, is the faculty that deals with these possibilities.

(3) Lastly, there is a general perspective. Jan Wilbanks argues that according to Hume the imagination is "the faculty of forming, uniting and separating ideas" (WILBANKS, 1968, p. 170) while Saul Traiger affirms that it is "a faculty that forms complex ideas without regard to the order of the complex impressions which precede them" (TRAIGER, 2008, p. 78). I'm convinced that both Wilbanks and Traiger are right when they call attention to the fact that the imagination rearranges the ideas that are originated by the impressions and makes something completely different out of it. But they forgot to stress another power this faculty has that might as well be as important as its power to associate ideas, which is its inferential role: "understanding or imagination can draw inferences from past experience" (HUME, 2007, T 1.3.8.13, p. 73). As I've argued above, the imagination has the power of associating ideas and it makes inferences specially when it associates by contiguity in time or place (as in the elephant's head case) and by cause and effect (as in the smoke trail case).

But another question remains: why are some of those inferences made by the imagination related to fiction (and as such have a negative epistemic status) while others are related to the natural sciences (and as such have a positive epistemic status)? The answer resides in the irregular and regular principles of the imagination.

3. The imagination between the natural sciences and fiction

Hume's epistemology is rooted in his empiricism and naturalism. According to him, a belief has a positive epistemic status, and as such is a candidate for knowledge, if it is a demonstration, or grounded in constant and coherent past experiences or indispensable for the conduction of the human life. When it comes to the imagination it is also important to make explicit if the belief was formed reliably or by sheer luck. In other words, we must find out if it was produced by regular or irregular principles[12]:

> I must distinguish in the imagination betwixt the principles which are permanent, irresistible, and universal; such as the customary transition from causes to effects, and from effects to causes: And the principles, which are changeable, weak, and irregular; such as those I have just now taken notice of [the notion of a "material substance"]. The former are the foundation of all our thoughts and actions, so that upon their removal human nature must immediately perish and go to ruin. The latter are neither unavoidable to humankind, nor necessary, or so much as useful in the conduct of life; but on the contrary are observ'd only to take place in weak minds, and being opposite to the other principles of custom and reasoning, may easily be subverted by due a contrast and opposition. (HUME, 2007, T. 1.4.4.1, p. 148).

I'm going to argue that when the imagination operates by regular principles it may be an important tool for the natural sciences, and that when it operates by irregular principles it may be useful for the creation of fictional narratives. Hume is well aware that it's hard to separate science from fiction when they overlap[13]. But we can and should take for granted the fact that fiction has no need to correspond our impressions, while science has the intent to describe how the world of experience is.

In order to find out if a belief is rooted in experience one should follow the copy principle and decompose the complex ideas (that are related to the belief) into simple ideas. If there aren't any corresponding simple impressions to these simple ideas, then the belief is either meaningless or it means something else. The main example is the philosophical notion of a "material substance". According to Locke (inspired by Aristotle), a substance is a *substratum* that can't be used as a predicate, but is predicated by other properties. In this sense, an apple has the properties of being red, sweet, soft, etc., and if one strips this object from all its properties, then there'll be an underlying thing called "substance". However, Hume argues that there is no such thing. He asks: from which simple impression is the simple idea of a substance derived? The answer is: none. When we experience an apple we don't have an impression of a substance, but of particular colors, tastes, textures, sounds and smells. Therefore, an apple is nothing but

[12] Excluding the capacity to perform demonstrative reasonings once it is performed by reason alone.

[13] Thought experiments and counterfactual arguments, for example, are commonly used by scientists.

those properties that are constantly conjoined in past experiences, so when one uses the term "substance" it is either meaningless or those conjoined properties (HUME, 2007, T. 1.4.3.1-11, pp. 144-8).

But there are more candidates for being the "mere fictions of the mind" (idem, T. 1.2.4.24, p. 36), "merely the offspring of the imagination" (idem, T. 1.3.9.4, p. 75) or the "trivial suggestions of the fancy" (idem, T. 1.4.7.6, p. 174). The idea of a green dragon is somehow rooted in experience because it can surely be decomposed into simple ideas that correspond to simple impressions. However, these "fables we meet with in poems and romances" where nature is "totally confounded, and nothing is mention'd but winged horses, fiery dragons, and monstrous giants" (idem, T. 1.1.4.4, p. 12) aren't rooted in experience in the stronger sense required for knowledge: they not only lack corresponding complex impressions, but they are also deprived from the coherence in our past experiences: nobody has ever seen, touched or smelled such a being. The idea of a green dragon was formed by the imagination when it is understood in opposition to memory, which means that such an idea is languid and unreliable. Finally, there's no need to rely on the naturalistic part of the argument because these fictions of the imagination are not essential for the conduction of human life, which means that these kinds of belief have a negative epistemic status.

Nevertheless, there are some beliefs without which we couldn't survive as a species. I could have investigated the beliefs in causality, in the existence of an external world or in personal identity, but such an investigation would make this paper lengthier than necessary[14]. Hence I've chosen a belief that is more general and primitive than the previous ones and that is also indispensable not only for the natural sciences but also for our daily lives: the belief in the regularity of nature. This belief structures our sense of reality once it makes us expect that from the same causes are going to follow the same effects. But why do we believe that nature is governed by physical-chemical laws and that the things that happened in the past are also going to be held in an analogous fashion in the future? We don't acquire this belief from pure experience because there is no taste, smell, sound, etc., that is equivalent to the regularity of nature. If there is no corresponding

[14] As Hume says in the conclusion of the first book of the *Treatise of Human Nature*: "'Tis this principle, which makes us reason from causes and effects; and 'tis the same principle, which convinces us of the continu'd existence of external objects, when absent from the senses" (HUME, 2007, T. 1.4.7.4, p. 172).

impression for the uniformity of nature, then we don't have any memory of such a conception. Anyway, memory can't be the source of such a belief because memory is always directed to experiences that happened in the past — and what is at stake are the future events.

The belief in the regularity of nature isn't formed by reason because the belief can't arise from demonstrative or probable reasonings. We can't demonstrate that the course of nature will remain the same through time because we can conceive that it may change in the future. Even though nature has behaved in such a manner that a piece of wood has always burned when I set it on fire, I can imagine that this same piece of wood is going to turn into a horse when I set it on fire — though I don't believe that's going to happen. And it's not due to probable reasonings because we don't know what is nature's scope of possibilities. And even if we did, the question would still remain: how do we know that the course of nature isn't going to change?

We believe that the course of nature is uniform because we've had a vast number of constant and coherent experiences in the past. *Ceteris paribus*, most of the times when I set fire to a piece of wood, it burned; most of the times when I drank water, my thirst was satiated; most of the times when I immersed in water an object that was denser than water, the object sank. Certainly these conclusions needn't be established by personal experience once they can also be reached by someone else's testimony. Anyway, these experiences are so constant and coherent that they constitute a habit that makes the imagination infer the lively conception that from these conjoined past experiences the same events will happen in the future:

> Experience is a principle, which instructs me in the several conjunctions of objects for the past. Habit is another principle, which determines me to expect the same for the future; and both of them conspiring to operate upon the imagination, make me form certain ideas in a more intense and lively manner, than others, which are not attended with the same advantages (HUME, 2007, T. 1.4.7.3, p. 172).

However, some of those effects may not follow from those causes. It is nomologically possible that the fire won't burn a given piece of wood, for example. But that is only possible if the *ceteris paribus* conditions aren't preserved — maybe that piece of wood was soaked wet or built with a fire-resistant technology. So the scientists must refine and establish with precision the conditions under which the same effects are going to follow from the same causes. And they refine it by coming up with hypothesis and testing them with empirical experiments. Even though there's always room for mistakes

once our senses, reason and imagination are fallible (we might miscalculate or infer causation from correlation, for example), the process of constructing natural laws is so reliable that it isn't only probable that our predictions are going to hold: they constitute a real proof and have a positive epistemic status.

Lastly, let's make a thought experiment so as to analyze how the imagination works by regular and irregular principles. Pretend there's a young man called David who lives in a small house in the countryside of Scotland[15]. David's house is pretty humble and only has a kitchen, a bathroom and a bedroom — he wished he had a pompous library where he could conduct his philosophical investigations, but his skeptical arguments gave him more headaches than fortunes. David keeps all his philosophy books in his bedroom — that is always locked when he's away — and he's the only one who has the keys. Given that David is a sociable man and doesn't want to be labeled as a freethinker in the community, he hid the manuscript of one of his favorite dialogues in a chest underneath his bed because he thought some of the ideas that are present in this writing might offend the religious people in his fellow country. Nevertheless, one day after returning from a six-month trip in Paris, David found out that the lock of his bedroom door was destroyed and that his chest and manuscript were gone. What has probably happened to his beloved artifacts?

David was not in his house when the lock of his bedroom door was cracked down and his chest disappeared. Therefore he didn't have any *impression* of that event (he wasn't an eyewitness), he can't have a *memory* of the incident (he didn't have a previous impression), and he can't use *reason* to try to solve it (nothing can be demonstrated here). So all that's left for him is to *imagine* what has happened to his belongings when he was away and he came up with two very distinct hypothesis:

Hypothesis 1: Scotland was cursed by an ancient magician who has the power to destroy all the hidden chests and manuscripts when their owners are away.

Hypothesis 2: Someone broke into David's house and stole the hidden chest.

Both hypothesis were formed by the imagination. One can easily think about an ancient magician by associating by resemblance the ideas of an old man who is wearing a cloak, maybe a big cauldron where he throws some herbs, etc., and also by cause and

[15] Names, characters, places and incidents either are products of my imagination or are used fictitiously. Any resemblance to actual events or locales or persons, living or dead, is entirely coincidental.

effect once we can imagine that some sort of spell was the cause for the disintegration of David's chest. Furthermore, one can also imagine that given that the lock of David's bedroom door was torn to pieces (maybe due to a crowbar) and that there was a valuable object inside the chest, then it could've been the case that someone broke into his house and stole his items. However, these hypothesis don't share the same epistemic status: one is bogus, the other is plausible. Why is that?

The answer lies in the fact that hypothesis 1 was developed by the irregular principles of the imagination, while hypothesis 2 was developed by the regular principles. Hypothesis 2 is more plausible than hypothesis 1 because it is rooted in experience: the destroyed lock definitely counts as an evidence that a thief might have gotten inside David's house. Although hypothesis 2 is still open to revision when new evidences are found, it is an interesting lead that is worth being followed.

Final remarks

Now it might seem evident that the imagination plays a major role both in fiction and in the natural sciences. It's due to its powers to form, unite and separate ideas that one is able to create or think about fictional objects and also to develop scientific theories. Even though dragons and the regularity of nature are both the offspring of the imagination, they are formed in a different manner. Fictional objects arise when one is freely associating simple ideas through resemblance, contiguity or causality. Scientific theories arise when one is inferring from past experiences — those that are constant and coherent — the existence of a pattern that shows there's something that wasn't provided by sense experience but that we should still believe is the case.

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