Rational Belief Systems

Belief and Knowledge

We humans are constantly in the process of understanding ourselves and the world we are living on. Starting as children, we look inside and around, and constantly construct and refine notions about reality. Some of these notions become concrete *objective natural propositions*, that is, ideas about the world which are true or not. Any objective proposition about reality matches (or not) such a reality to any given extent, and when the match is high enough, the proposition is considered true, otherwise, is considered false (in the case of modern scientific propositions, the actual *degree of certainty* [1] is used instead of just true/false). Clearly, whether a proposition (about reality) is true or false (or its degree of certainty, to be more precise) is an objective value of the proposition itself. For example, whether the Earth circles around the Sun or is it the other way around is true (or false) all by itself, regardless of what any of us humans might think of it. Likewise, whether a non-physical higher entity being the primordial source of anything else exists or not, is also true or false by itself.

On the other hand, each one of us *individually* assign to any given proposition a *truth value* based on our own personal decision. Therefore, while propositions do, by themselves, have a truth value of their own, such value is *external* to any of us. Thus, we *decide* on the truth of propositions on our own. In other words, we *subjectively believe or reject* propositions independently of the external objective truth of the proposition itself.

Any proposition in our heads (as opposed to the proposition itself) is a **Belief**, and depending on the reasons we held for considering the proposition true or false (or something in between), such a belief is given the status of **Knowledge**. In other words, **Knowledge is Justified Belief**.

In modern days, it is commonly accepted that, on the one hand we have *believes* (of which we cannot be sure) and on the other we have *knowledge* (of which we can be sure). However, in reality, all we really do is believe, and we *label* some of our believes as knowledge (for a variety of reasons), therefore, while it is very common to classify beliefs and knowledge into separate groups, this over simplification, which seeks to distinguish *certainly* from *possibly*, is nevertheless a mistake, and is ultimately not really useful. Knowing is not really different from believing for it actually *is* believing, only that somehow justified.

The first part of this work explores, analyzes and reviews the justifications that promotes belief to knowledge. It proposes to loosen up the requirement on certainty when it comes to *natural knowledge* (i.e. about the external reality), arguing why and how, and it attempts to show how such a requirement is many times unfulfilled.

Propositions are independently, objectively, true or false, and we try to preserve this objectivity. Unfortunately, our mind is an entity independent from the rest of reality so anything we think, which includes propositions, is inevitably subjective, no matter how hard we might try (with good reasons) to think objectively.

That is, when it comes to the external reality, we don't really "know" as in being somehow able to have the objective truth store itself in our minds. That is just not possible. Instead, we make a conscious, individual *decision* to regard any proposition true or false. That is, we believe or reject anything that is proposed, and, consequently, what we "know" is ultimately something that first and most importantly we "believe" (and for which we have *appropriate justification* so we think of it as something we know and not something we *just* believe)

The conscious process of deciding on the truth value of a proposition is, in practical terms, automatic, and at that, the justifications for the decision range anywhere from subconscious to deeply meditated. Most of us, most of the time, don't really give much thought to the process and reasons why we decide on the truth value of the propositions we come across (but we have a significant tendency to simplistically believe in the propositions that emerge from our own thinking, that is, our own ideas)

The Scientific Method

Already in the ancient times, some men struggled with the problem of justifying believes, that is, of *knowing*. How can we tell whether an idea about reality is true or not? Why do we decide either way? Should the decision be set in stone, or should we re-evaluate and possibly change our mind? These are long standing, open problems and the solution is *still* rather complex despite the giant advances on science, technology and philosophy.

The most fruitful approach to the *problem of objective knowledge* is to capitalize on the fact that objective propositions have a truth value on their own, regardless of our subjective decisions by which we believe or reject them. Over time, we discovered ways to approach such objective truth in order to develop the justifications needed to subjectively decide whether to believe or reject them. This involves several elements, which we refined over the centuries, most significantly the last three (but we started to formally think about a method for science, at least, as far back as a thousand years ago). Some of these elements are:

(1) the formalization of the proposition itself by creating and using a universal, unambiguous, assessable language (such as mathematics)

(2) the determination of which types of propositions are better suited to be given justifications (for instance, propositions about the *reasons* of reality are not well suited)

(3) the discovery of procedures that can be used to evaluate the proposition (such as matching or validating relationships, or collecting facts and comparing them with the consequences of the proposition)

This approach is known as *The Scientific Method*.

Philosophers of Science (not necessarily under such a title, but certainly operating as such) construct, refine, extend and sometimes re-construct the scientific method, and, ideally, scientists follow it (even though in practice scientists often tailor the general method, which itself feeds the process of developing it even further). The goal of the scientific method is to determine the procedure to use to justify a scientific proposition. It requires that the proposition is testable, that is, it provides a way to evaluate its degree of certainty.

Some objective propositions refer to abstract realities that we ourselves create, such as a human language, a field of mathematics, or a computer program. These are called *formal* objective propositions (and are the study of **Formal Sciences**). Because the abstract realities are things that we created ourselves, with our own rules, the justification for believing (or rejecting) any formal proposition rests entirely on logic. There is no uncertainty on whether "2+2" is "4", or whether "red" is "not a verb". While anyone can believe otherwise, to *know* a formal proposition amounts to apply a set of rules (logical, mathematical, analytical, etc..). While mastering said rules and applying them correctly is the subject of large fields of study (such as Computer Science), the entire problem of *formally* knowing is confined to our own intellectual skills and hard work. When it comes to Formal Sciences (such as Linguistics, Mathematics, Information Theory, etc...) the simplistic distinction between knowledge and (unjustified) belief is appropriate. We can righteously claim that we don't "just believe" but effectively "know" that "one and only one line passes through two points on a euclidean geometry". However, when it comes to Natural Sciences, things are quite different.

In the case of natural propositions, justification requires that the proposition's consequences can be contrasted with evidence (that is, facts about the reality that the proposition refers to). For example, most propositions in "physics" --the field of Science that studies the fundamental structure, properties and behavior of matter and energy at its most general form--offer predictions about future events involving matter and energy as consequences that can be correlated with observations (facts) on said matter and energy.

Constructing scientific natural propositions that can offer predictions about future events is quite a challenge. Sometimes is simply impossible: what's the next lottery number? or what will mankind do 50.000 years from now?, and sometimes the predictions can only be statistical probabilities: what will be the financial market value next month? or what will be the spin of a particular electron when it hits a detector?.

Even if we do have well defined predictions, such as "no mass-carrying object can accelerate beyond the constant speed of light", collecting observations that can be correlated is also quite a challenge. For example, about a hundred years ago we realized that there is absolutely no way of <u>empirically</u> collecting any information about reality, that is, of *directly* observing it, without *interacting* with said reality. Consequently, if we want to, for instance, know something about "group A" of *subatomic particles*, we ought to have them interact with some "group B" of *also* subatomic particles, which renders any conclusions about group A impossible to differentiate from conclusions about group B. We don't stumble across this "measurement problem" in ordinary life simply because the fragments of nature we use (such as light) are comparatively insignificant against life-scale objects such as a stone, or even the tip of a needle.

Any objective proposition that offers predictions as a way to test it, is, obviously, a proposition on what reality *does*, not on what reality *is*. So, can we propose what reality "is" instead of what it does? Consider the simple proposition "there is a blue pencil on this table right now". This can effectively be tested by contrast against observation, but, while this proposition refers to what *is* on the table, in order to verify it we must *do something* with it. For instance, cast light on it and see the reflection with our eyes. We cannot really, ultimately, verify that there effectively is a blue pencil there, all we can do is interact with it in the hope of inferring that the proposition is true, and when we do that, we construct predictions about the pencil's *behavior,* not the pencil's existence or its attributes. In other words, we cannot really validate this exact *noumenological* Footnote on noumena and phenomena proposition, instead, we (often implicitly) derive other *phenomenological* propositions (such as "I can *see* the blue pen because it is there"), which we can validate then indirectly co-validate the former.

The scientific method demands that any scientific natural proposition, which is bound to refer to what nature does, not what nature is, be testable, and at that, it requires at the very least that the proposition be *falsifiable*, i.e. there is a way to show it to be wrong (with enough certainty).

Scientific Theories vs Scientific Knowledge

The scientific method, therefore, lays the foundation for the social construction of Scientific Theories, and the collective possession of Scientific Knowledge, which in turn, proved to be the most generally useful type of knowledge as showcased by technology.

Anything that we consider true or false is a belief, and we promote them to *knowledge* when we find appropriate justification. But any belief is the result of subjective, inescapably *personal* decision. When I am presented with a proposition, I myself, personally, take a stand and believe or reject it. If the same proposition is presented to someone else, the same happens in *his* mind. Thus, we agree or disagree on shared propositions but, strictly speaking, we don't share believes (or knowledge) directly, since that involves a personal process involving subjective decisions.

When a scientist produces objective propositions about reality, he *personally* decides whether to believe it or not based on the justification he founds, ideally subject to the criteria set forth by the scientific method. He then shares the proposition (but not the subjective believe), which is in turn "processed" by other scientists. The scientific proposition is then challenged in a common ground from which the individual, personal believes, collectively emerge, giving rise to **Scientific Knowledge**. Therefore, scientific knowledge refers to the collective agreement on each personal belief, unlike the scientific propositions themselves, and their associated justifications, which form the **Scientific Theories**, which are objective external entities.

This distinction between **Scientific Theories**, which are the things found in books, thought in school and discussed in forums, and **Scientific Knowledge**, which is the collective justified believe in those theories (where each individual person contributes with his own personal belief) is central to the core of this work. Although most literature on the topic will not directly draw such a distinction, even if the rationale presented here can easily be found in most any work on the topic, the distinction is actually quite important, so allow me to elaborate:

During the production of Scientific Theories, the scientists *involved* do use (ideally) the scientific method in order to find appropriate justification to believe or reject those theories. Eventually, scientific theories get the level of agreement among scientists necessary to become generally accepted. Once accepted, scientific theories are massively shared. Scientific Knowledge is *then* constructed, and is brought about by the collective believes of both the scientists who produce the theories and the rest of us who are *educated* about them (including all other scientists not involved in the production of the theory).

But, does the scientific method, which provided the appropriate justifications for the construction of the scientific theories, provides as well the justification for the decision made by each uninvolved individual being simply educated about it? That is, do fellow scientists, students and general public reproduce the experiments, repeat the observations, challenge the data, etc...? In my experience, not at all, not even remotely. Maybe most fellow scientists, but the great majority of students, specially school and under-grad students (which represent by far the most part of educated humanity), let alone the general public, justify their believe in the scientific theories that are presented to them from a varied number of factors, among which the criteria of the scientific method is only marginal. The *authority* of the educating party, the (presumed) level of *global acceptance*, and the *cultural background* are far more important in the justification that constructs the Scientific Knowledge, despite the fact that the Scientific Theories on themselves are scientifically justified.

As it turns out, since Knowledge is ultimately Justified Belief, even Scientific Knowledge finds the justification in several different places, some more "scientific" than others, situation which varies significantly as we move from the actual scientists to the rest of us.

Even among scientific colleagues on the same field, and because knowledge is, ultimately, subjectively personal,sometimes you can identifies differences in the "processing" of a single, shared scientific idea. While this won't be the case on simple concepts such as "force equal mass times acceleration", it is on complicated subjects such as quantum mechanics.

This distinction between Scientific Theories and Scientific Knowledge seems to be, as far as I know, a novel contribution of this work (even though the rationale for the distinction can be found in most previous work), and at such, is a proposal, as it is most of the ideas in this work.

***** TO BE CONTINUED *****

[1] Or Bayesian probability as it is formally called