

The Two Faces of Beliefs

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Abstract

It is crucial to distinguish between two kinds of likelihood, “hazard” and “doubt.” Hazard is about the space of likelihood of events unaffected by prediction and, hence, the space is closed. In contrast, doubt is about the space of likelihood of events affected by prediction and, hence, the space is open. The confusion of hazard with doubt is at the origin of what one may call “the belief paradox” as expressed in Newcomb’s Problem and the Book of Job. A resolution is proposed by a reinterpretation of Pascal’s Wager in such a way that allows us to differentiate between two kinds of beliefs: conventions and frames.

Beliefs-as-conventions are about regularities of nature (which include human society) such as the likelihood of precipitation, earthquakes, stock market crashes, standards to solve coordination problems, and norms of trust to avoid prisoners’ dilemma outcomes. Although some of these conventions involve self-fulfilling prophecies related to the backward induction paradoxes, they should not be confused with beliefs-as-frames. Beliefs-as-frames are about convictions concerning the likelihood of the ability of an individual (in the sense of a person or an organization of persons) to achieve an end. Conventions and frames involve *likelihood*, which probably explains why they are usually confused. Other reasons for the confusion is that they appear to have a similar morphology: Both kinds of beliefs act as deep institutions that are path-dependent (entrenched); both involve tacit knowledge; both combine inquiry with action; both resist immediate revision or correction when the prediction fails; and frames presuppose and utilize conventions (but not *vice versa*, normally). However, morphology does not justify the use of the same model to explain the two kinds of beliefs—as much as biologists do not consider dolphins as “fish” because of morphological similarity.

Many thinkers, even ones critical of the standard theory of choice, fail to appreciate the difference between conventions and frames. They usually group both under the same concept and provide a single theory to account for them. For example, John Searle places them in what he calls the “Background.” Friedrich Hayek treats both as “rules.” Herbert Simon regards both as “heuristics.” Douglass North names both “shared mental models.” Kenneth Boulding views both as “images.” Richard Nelson and Sidney Winter call both “routines.” For Ronald Coase and others they are “institutions.” To wit, John Dewey

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and Arthur Bentley [1999] provide the ultimate defense of why conventions are supposedly not different from frames. For Dewey especially, both beliefs amount to one belief, which he called “having” or “primary experience.” For Dewey, there is a single model of action, which he calls the “transactional circle,” that explains all beliefs.

The central contribution made here is to show how to ground the convention/frame distinction. While both kinds of beliefs involve likelihood, there are two kinds of likelihood, viz., doubt and hazard. While hazard can be quantified, doubt cannot. The proposed doubt/hazard distinction has nothing to do with the failed distinction of Frank Knight, viz., the uncertainty/risk distinction. Knight stressed the importance of unique events (such as a singer losing her voice) in order to conceive uncertainty (subjective) as radically different from risk (objective). Knight’s conception is untenable as Savage has shown. As proposed here, hazard is about mechanistic events (rolling clouds, moving rivers, and even self-fulfilling prophecies as in speculative bubbles), where its quantification, whether accurate or not, does *not* affect the underpinning structure of the probability distribution. Doubt, on the other hand, is about the potentiality of *ability* of the organism to carry out a task. The attempt to quantify potentiality of ability along a probability distribution involves action, which inadvertently forces ability to develop and change. That is, the attempt to quantify doubt is doomed to fail because, once one attempts to measure or to verify the guess, one is involved in experience. Experience, even at very minute levels, leads to the development of the ability under focus. Thus, even theoretically, there is no *given* probability structure that can be captured in the case of doubt.

There is an asymmetry between the two faces of beliefs, conventions and frames. The proposed resolution of Newcomb’s Problem expresses the asymmetry. As proposed in this paper, the two solutions identified by Robert Nozick are not contradictory. One solution (the dominance principle applied to the theory of beliefs) produces one kind of belief (conventions) because it recasts the problem in terms of hazard. The other solution (expected utility principle reinterpreted as Pascal’s Wager) produces another kind of belief (frames) because it recasts the problem in terms of doubt.

If the theorist insists on the similarity of conventions and frames, agents should be confused about the proper belief to adopt. This would make agents paralyzed, i.e., indecisive. If so, the standard theory of rationality—based on the idea that agents are capable of deciding on the proper belief (the completeness axiom)—would become untenable. Of more importance, the theory would face the anomaly of explaining why most agents, most of the time, are not in the state of paralysis.

The proposed theory promises to shed light on different problems. For example, it shows how to distinguish among science, religion, and cults. It also points the way towards a theory of rationality that can also account for entrepreneurship. It offers a ground for the demarcation between the market and the firm—whereas Ronald Coase and new institutional economics generally cannot distinguish them. Also, along the same line, it offers a reason for why to view the state as an autonomous individual, which has ramifications for the theory of democracy. The proposed theory sheds light on two kinds

of commitments and two kinds of delusions. In this manner, it offers a systematic sense of the anomalies highlighted by behavioral economics. Finally, the proposed approach affords a conceptual frame that allows the identification of evil, which social science disciplines generally cannot account for even theoretically.

Keywords: belief paradox; convention problematics (I & II); three variants of single-face of belief views (self-actional; interactional view; single transactional); double-face of belief view; naïve naturalism; market/firm distinction; society/state distinction; delusions; commitment; behavioral anomalies

Part One

The Belief Paradox

1

Two Kinds of Prediction

1.1 The Example of Gravity

For the greater part of our daily life, we are involved in routines ranging from pushing carts in grocery stores, brushing teeth, to driving, and maybe tilling the land. Such routines are based mostly on subtle, but sometimes not-so-subtle, predictions. I will argue here that there are two kinds of prediction that are often confused. First, there are predictions about regularities in one's environment—such as how a shopping cart in a parking lot would most probably roll if left unattended. Second, there are predictions about one's ability as a producing organism—such as whether one can perform the shopping task. These two kinds of prediction are confused partially, but not totally, because both are subtle—especially if the person who is doing the shopping is a healthy adult. But even when the predictions are not subtle, they are still confused for reasons that should become clear when we discuss the role of ideologies and narratives as the basis of action.

Let us examine action predicated on prediction with regard to the mundane and familiar phenomenon of gravity. Let us examine gravity in the case of a rolling shopping cart in a parking lot or, easier, let us examine it in the case of the accidental fall of a glass plate. Also, let us examine gravity in the case of carrying shopping bags from the shopping cart to the automobile or, easier, let us examine the case of striking a pickax used by a farmer to till the soil. I will present here the distinction between the two kinds of prediction and I will raise, and answer, possible objections to the proposed distinction.

The observation that bodies accelerate while falling down to earth is a settled convention to the point that one does not remember how he came to believe it. The term “convention” denotes awareness of regularities of nature, which includes regularities of human behavior in the environment of the agent. The convention can be an explicit or can be an implicit belief. In the case of bodies accelerating as they fall, the convention is probably an implicit belief. This belief *qua* convention entails that a glass plate would more likely shatter if it falls from a great height than from a low height. Such a tacit convention is a prediction that is based on what is called throughout as “action-as-awareness,” where the formed belief (convention) is basis of awareness of one’s environment.

The consequent “belief-as-convention” differs from another kind of belief, called here “belief-as-frame.” The distinction between the two kinds of beliefs is the central point of this paper. Belief-as-frame is about one’s hope, in the sense of faith, in one’s ability. It is true that such hope or faith is *partially* based on one’s awareness of the facts and regularities of one’s environment. However, it is also based on an element that ultimately cannot be verified or refuted by such facts or regularities—as shown shortly. When one, for instance, tills the soil with a pickax, one uses conventions about gravity. However, one also uses faith, i.e., belief-as-frame, to inform his ability that one can till the soil and achieve the task.

The action predicated on belief-as-frame is called “action-as-achievement—in order to distinguish it from “action-as-awareness” that generates belief-as-convention. I attempt to show that, given the difference between the two kinds of beliefs/actions, which is the whole thrust of the paper, we have two different kinds of prediction.

What makes the prediction of the impact of the glass plate upon falling different from the prediction of the impact of the pickax? The prediction of the fall of the glass plate does not entail the development of the actor, while the prediction of the impact of the pickax involves the development of the actor as a biological organism. It is common to confuse the two kinds of prediction because the prediction of the impact of the pickax, i.e., action-as-achievement, utilizes tacit and not-so-tacit conventions that inform the acceleration of falling bodies in general. But prediction of the impact of the pickax, based on action-as-achievement, is more than prediction based on conventions.

To elaborate, in the act of soil breaking with a pickax, the agent utilizes the belief-as-convention about gravity just mentioned. Namely, the agent uses the awareness that it is more effective to break the soil with one strike if one strikes the soil with a pickax from a great height than if one strikes the soil with a pickax from a lower height. The use of the pickax, i.e., action-as-achievement, utilizes gravity and many other resources to achieve a goal, e.g., to plant a vegetable garden. But when one adopts the belief-as-convention about gravity (and may express it mathematically as Newton did), one is involved in making warranted beliefs about one's surroundings, on the basis of "action-as-awareness," in order to indicate that one is trying to become more enlightened about one's surroundings. However, the act of soil breaking itself is more than just the application of Newton's law of gravity. It also involves an achievement in the sense that the agent does not know, prior to the act, whether he will succeed. As Figure 0

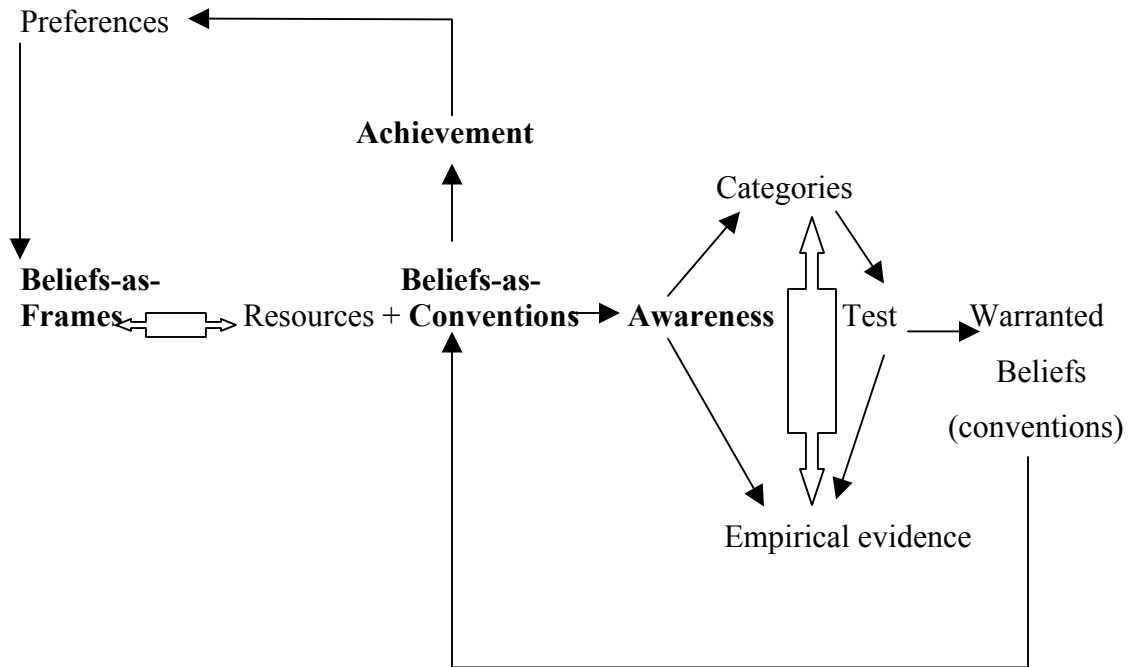


Figure 0: The Double-Face of Belief View

highlights, each kind of action performs a different function in the proposed two-circle facets of the anatomy of action. Each kind of action is based on a different kind of belief, as proposed here by what is called the “double-face of belief” (DFB) view. The circle on the right-hand side is action-as-awareness, whereas beliefs-as-conventions set the stage for awareness and probably new testing in case of new empirical evidence, producing “warranted beliefs” that become subtle conventions. In contrast, the circle on the left-hand side is action-as-achievement, whereas beliefs-as-frames organize the resources and beliefs of the agent according to a narrative (story or ideology) which provides a vigorous reason to achieve a goal, namely, to satisfy preferences. Such preferences play a role in the formation of beliefs-as-frames.

The node at which the two circles connect is “beliefs-as-conventions.” To stress, while conventions enter as elements in the assessment of ability, frames and ability do not (or should not) influence the formation of conventions. Conventions become warranted as a result of testing and verification of the transaction or union between categories of the mind and sense data.¹

The critical question, on which this paper stands or falls, is whether it is legitimate to distinguish the two circles. That is, is action-as-achievement very different from action-as-awareness in terms of the use of logical and scientific reasoning? Given that

¹ Interestingly, Karl Pribram [1971, pp. 99ff.] identifies two different processes in the brain: The brain operates differently when it is involved in awareness as opposed to when it is involved in carrying out habitual tasks. On the Other hand, Daniel Wegner [2002] seems to argue that there is only one process in the brain which combines, to use my terminology, awareness with achievement. The fact that humans sense mental causation when they try to achieve something is an illusion as illustrated in clinical disorders such as alien hand syndrome, dissociative identity disorder, and schizophrenic auditory hallucinations. The illusion of mental causation is exposed in phenomena such as hypnosis, automatic writing, Ouija board spelling, water dowsing, facilitated communication, speaking in tongues, spirit possession, and trance channeling. According to Wegner, when the agent experiences consciousness just prior to an action, he tends to treat it as the cause of action, as if the agent is in control of his activity. While Wegner’s theory is appropriate to the awareness circle, it might not be applicable with regard to the achievement circle.

striking the soil with a pickax uses gravity (a convention or observed regularity), one is tempted to regard it as following the same natural laws as the fall of a glass plate off the table towards the ground (which follows the same convention). In both cases, one can estimate the force of the objects once they reach the ground, and even one can think of them as behaving according to the same routine. The routine can be greatly approximated by Newton's law:

$$F = m \cdot a.$$

where force (F) is function of mass (m) and acceleration (a).

It is easy to consider the prediction of the force striking the soil as similar to the prediction of force of the glass plate when it falls. The fall of the glass plate and the fall of the pickax are, in fact, so similar that their contrast may not be robust enough to make the crucial point upon which this paper stands or falls. But if I can make my case with such a non-robust example, my point would be made definitely with regard to actions which are more entrepreneurial and challenging than striking the ground with a pickax.

Once the two kinds of action (striking the soil and understanding the falling of the glass plate) are mastered, they become settled and tacit, giving the appearance that they are the products of the same single circle. The striking of the soil with a pickax from a greater height to generate greater force becomes habitual and unreflected action as a result of accumulated experience. Likewise, the expectation that the glass plate would shatter if it falls from a great height is so tacit that one would spontaneously, and without reflection, seek cover from the flying debris. The fact that both actions have the character of a tacit routine and unreflected spontaneity does not mean that the two actions are of the same family. The fact that bats fly does not make them birds or the fact that

dolphins and sharks have a somewhat similar morphology does not make biologists classify dolphins as “fish.”

The fundamental thesis of this paper is that there is a subtle, but crucial difference between the two kinds of actions. This difference makes it impossible even theoretically to arrive at a *quantifiable* estimate of the force of the pickax upon impact—while it is possible, at least theoretically along a given space of hazard function, to arrive at a quantifiable estimate of the force of the glass plate once it reaches the ground. With the case of the falling glass plate—if one can include air friction, Brownian motion, and other contingent obstacles—one can estimate a probability distribution of the force of impact, what is called “hazard” here. One may start with a subjective probability distribution of such an impact. But the subjective distribution can reach greater accuracy, i.e., get closer to the true underlying distribution, as the number of experiments or trials of falling glass plates increase.

In contrast, when one strikes the ground with a pickax, one cannot know along a hazard function, even in the subjective sense, the acceleration that his *ability* is applying. The application of ability entails what is called here “doubt” about one’s ever-developing biological ability—doubt which differs from the hazard probability function. For hazard probability, one can update it in light of new information that reveals, more and more, the underlying *given* space of probability. However, for doubt concerning ability, which underlies action-as-achievement, there is discovery of *given* facts or regularities of nature. In the case of doubt about ability, there is no *given* space of probability. Here is the rub: Each time the agent tries to measure his prediction about impact of the pickax, he

has to measure it by *applying* his ability—whereas *the action of application or measurement leads to the development of ability*.

In fact, here is the paradox, the act of testing is exactly another action to achieve a goal. The action necessarily entails psychological and biological processes of *irrevocable* development. That is, ability cannot be revisited again: Time is truly an arrow [Georgescu-Roegen, 1971, pp. 60-94; Khalil, 1990c, 2003g].

Ability is nothing but the set of means and faculties put in a coordinated motion. Ability consists of, even in the simple task of using a pickax, a complex coordination problem. Otherwise, children and the uninitiated should not be warned about the use of a pickax. The ability involves eye coordination, handling coordination, muscle coordination, posture, and so on. It involves the skill of avoiding striking one's toes or other nearby precious objects. Of course, for all practical purposes, one can reach an estimate of the ability of an adult who is experienced. However, one cannot reduce, for theoretical reasons, doubt about ability into a hazard function. Ability continues to develop, although at a very miniscule rate in the case of repeated use of the pickax, each time one tries to measure it.

This observation is the cornerstone upon which the doubt/hazard distinction is shown and, hence, upon which the frame/convention faces of beliefs is revealed. Given that ability can never, even theoretically, be pinned down, the doubt of action that tests ability cannot be quantified into some hazard function that is derived from a given space of likelihood. Each time the organism tries to pin down and measure ability, ability develops by the act of measurement.

1.2 Outline of the Project

There are diverse objections to the double-face of belief view as based on the distinction between two kinds of prediction, which I discuss next. The central thesis of the double-face of belief view promises to shed light on many debates concerning the human condition that supersedes any historical or cultural specificity. For example, the idea of two faces of beliefs promises to shed light on the general difference between science and religion: If scientific theory is category-dependent, i.e., there are no “brute facts,” how is it still possible to differentiate science from religious beliefs? On the other hand, if religious beliefs are based on faith, how do they differ from cults?

Further, the frame/convention idea arising from the double-face of belief view provides grounds to understand entrepreneurship and innovation. In addition, it provides bases for the delineation between organizations (such as firms and states) and structures (such as markets and civil societies). In particular, the organization/structure distinction entails the state/society distinction, which has important ramifications with regard to the theory of democracy. The double-face of belief view, moreover, sheds light on the difference between two kinds of commitment, viz., the commitment to an ideal or a career, whose violation invites self-deception, as opposed to the commitment to integrity and honesty, whose violation invites self-rationalization. This distinction is related also to the different behavioral paradoxes uncovered by behavioral economics. Finally, the distinction provides an operational definition of evil, which the standard theory of choice, and even non-standard approaches, cannot identify.

Section two recasts the Book of Job in terms of the double-face of belief view. Section three discusses the doubt/hazard distinction. Section four exposes critically three

variants of what is called here the “single-face of belief” (SFB) view. The variants are the self-actional (normative sociological theory), interactional (standard theory of choice), and transactional views of beliefs and their consequent theory of action. The transactional view, proposed originally by Dewey and Bentley [1999], serves as the intellectual backbone of much of the heterodox criticisms of standard theory of choice.

The transactional view of action/inquiry solves the convention problematic I that arises from the self-actional and interactional approaches. As shown in section five, however, the transactional view suffers, like the other two approaches, from the belief paradox, i.e., the convention/frame confusion. In addition, the section provides a new basis for the doubt/hazard distinction. Section six expands on the double-face of belief (DFB) view and discusses in details the two circles of action.

The second part, consisting of ten sections, highlights briefly some major “cash-values” of DFB in relation to philosophy of science, entrepreneurship, theory of the firm, theory of the state, democracy, behavioral anomalies, the problem of commitment and rational choice, and the problem of evil.

1.3 Three Objections to the Two Kinds of Prediction

There are three kinds of possible objections to the double-face of belief or action view, viz., the difference between action-as-achievement (related to frames) and action-as-awareness (related to conventions). The first kind asserts that there are, for all practical purposes, maximum limits to the development of ability. The second kind affirms that frames and conventions have the same properties. The third kind, springing from the

backward induction paradoxes [Reny, 1992], asserts that conventions (at least concerning social regularities) are really frames.

1.3.1 Objection One: Ability, for Most Practical Purposes, is Fixed

This kind of objection asserts that, for all practical purposes, you can construct a probability distribution about ability.² This objection has two strands.

The first strand runs as follows: You can still put a probability distribution on potential achievement because there is a maximum level of ability set by biological endurance. To revisit the example of the pickax, the man with the pickax can never till an acre in one week. Another example, the world record for the long jump is something like 32 feet. And there exist physics-based computer models that say that no human could ever jump more than 36 feet. So, for any given individual long jumper entered in a competition and seeking to attempt his best, he can simply just put a probability distribution over his current personal best (say 31 feet) and the maximum possible which is 36 feet. And if he can do that, he has resolved the doubt about ability into a fully quantifiable hazard—similar to how Savage transformed Knight's concept of uncertainty into a subjective risk.

To answer this objection, let us examine the man with the pickax. I discussed one level of organization of human ability, namely, where the agent is organizing his diverse faculties in order to till the soil. He coordinates among the muscle system, the inhalation system, the blood circulation system, the balancing system, and so on. If one puts a maximum limit on this organizational activity, this agent can never till more than one

² Sean Flynn raised this kind of objection.

acre a week. However, from where did this maximum limit come? It is suddenly introduced by invoking senescence and mortality.³ If the agent does not experience the

³ Interestingly, what is aging and why has the evolutionary process failed in discovering the gene for immortality or elixir in the past two billion years of evolution? Even amoebas, which are unicellular organisms, are mortals if one conceives their asexual division as “re-birth.” So, what causes organizations (unicellular and multicellular) to age? There are diverse theories of aging without a clear consensus among organismic and micro biologists. Also, neo-Darwinian evolutionary biologists cannot reach a consensus on explaining aging [Gavrilov & Gavrilova, 2002]—although they can explain longevity.

With regard to longevity, according to neo-Darwinian theory, there is a trade-off between investment in, what one may call, the “endosomatic capital” to retard aging and investment in the endosomatic capital to enhance the organism’s ability to mature and escape fast from predators. Both kinds of endosomatic capital allow organisms greater opportunity to reproduce and to pass on the genome line. However, there would be no point of investing so much in longevity capital if the organism cannot run fast enough and hence die with great probability at young age, i.e., prior to reproduction. That is, given that the objective function is fitness as defined by the number of viable progeny, and the constraint function is the resources dedicated to endosomatic capital, it would be more efficient (if the organism does not have the armor of the tortoise) to invest resources in endosomatic capital that helps the organism to escape predators than to invest resources in endosomatic capital that assists the organism to retard aging.

process of aging, and remains immortal, his experience would continue to invigorate the development of all lower-level systems of his biological organization. If we ignore senescence, one could not put a maximum limit on the development of ability. The point here is not to construct a science-fiction scenario. Rather, the imposition of an upper limit is suddenly introduced. Where does the upper limit come from? The upper limit or maximum does not arise from the nature of experience. It is similar to the sudden introduction of friction in order to nullify Newton's law of inertia. It is true that friction slows down moving bodies—but friction is no argument against the law of inertia. Likewise, one cannot invoke a maximum limit, which entails aging and mortality, to assert that action-as-achievement is the same as action-as-awareness. Of course, there are maximum limits for all practical purposes, but such limits can only be introduced in *ad hoc* fashion in the sense by appealing to mortality, which is not part of the model. One can as well, at the theoretical level, appeal to angels or God's miracles and come up with no maximum limits.

The second strand of this objection runs as following: What about situations in which one is not concerned with doubt about ability but just with whether or not ability exceeds a fixed level. Let us grant that ability develops with the act of testing it. However, if a logging company is only interested in whether a given employee can cut through 15 trees in an hour, who cares whether the employee is capable of cutting 29 or

However, such a neo-Darwinian model explains the extent of investment to retard aging. It does not answer the original question: Namely, why do organisms age in the first place?

30 trees an hour? In labor negotiations, to make operational decisions on wages, both parties should not care about doubt and the growth of ability. They would agree about the wage and expected ability, assuming that ability fluctuates according to a given hazard likelihood.

To respond to this objection, it is true that for all practical purposes, and in labor contracts, agents do agree about productivity and wage payments. But this is hardly a critique of my thesis. It would be enormously cumbersome to re-negotiate contracts in light of incremental improvement. So, people construct as if there is no improvement in order to avoid free riding or loafing. But such artificial constructions do not tell us about the nature of work—or the nature of the employment contract as opposed to the commercial contract (discussed below). For instance, Newton’s law of gravity is a great approximation, but it fails to uncover the relation between space and time. Insofar as one’s goal is to uncover the nature of belief-as-frame, we need to note how action-as-achievement cannot be reduced to a subjective or objective probability distribution.

1.3.2 Objection Two: Frames and Conventions Have the Same Properties

There are different strands of the thesis that frames and conventions have the same properties. The first strand, and least interesting objection, is the argument that Newton’s law and its formulation involve at least some mental activity, if not the undertaking of experiments and tests. On the other hand, action is based on conventions or theories of how the world works. While users of pickaxes do not need to know Newton’s law of gravity, more recent technological innovations usually employ scientific theories. However, the proposed distinction is not based on the old inquiry/action dichotomy that

Dewey criticized and which, more recently, S.L. Hurley [1998] questioned. While the predictions of impact of falling pickaxes and falling glass plates involve action, they are different kinds of action, one is about achievement and the other is about awareness.

The second objection is to accept the distinction between the two actions and argue that, nonetheless, the same transactional circle can handle both because they share a similar morphology as routines. For example, when the agent gains sufficient repertoire on how to strike the ground with a pickax, he would do it routinely—similar to how he would routinely conceive the color of the chair upon which he is sitting or the background humming of the air conditioner.

There are many reasons for confusing the two routines. To mention a few, conventions and frames involve *likelihood*. However, as shown above, the two likelihood, hazard and doubt, are far apart from each other. Another reason for the confusion is that both kinds of beliefs act as deep institutions that are path-dependent (entrenched). However, the two kinds of institutions do not have the same basis of justification. A further reason for the confusion is that both combine inquiry with action. However, inquiry and action are connected differently depending on the goal. For action-as-achievement, the goal is to reach a more coherent organization. Conventions are used insofar as they facilitate such a quest. For action-as-awareness, the goal is to discover a regularity of nature, where one is not supposed to use frames (i.e., faith or desire) in such a quest. That is, frames presuppose and utilize conventions which can be the result of explicit inquiry as well as tacit knowledge—but not *vice versa*, normally. An additional reason for the confusion is that both involve tacit knowledge. However, tacit knowledge operated differently depending on the goal, as just mentioned. A further reason for the

confusion is that both beliefs resist immediate revision or correction when the prediction fails. However, the failure of prediction does not involve the change of likelihood in the case of awareness of regularities of nature, but it does involve the change of likelihood (development) in the case of achievement. So, the morphological similarity of frames and conventions does not justify the use of the same model.

The third objection entails the observation that conventions actually change, similar to frames, as one discovers anomalies that challenge the theory. This might be true, but is not *necessarily* the case. That is, action-as-awareness does not necessarily lead to the change of belief-as-convention. If one believes that early frost kills flowering plants or that the Earth is not flat, practice need not necessarily lead to the change of such belief-as-convention. In contrast, action-as-achievement *necessarily* leads to the development of ability and, hence, should have an impact on the belief-as-frame. That is, when one acts based on doubt of his ability, and his ability develops consequently, his frame of what he can achieve is necessarily affected.

Nonetheless, the third objection may respond in the following manner: Theories are always subject to change because anomalies arise. However, such possible rise of anomalies that may disturb a convention is not imminent or inevitable. Once a convention is adjusted to incorporate anomalies—such as the eventual dominant belief among the educated in Europe at the age of exploration that the Earth is round—it will continue to be the default unless overwhelming, new evidence arises to the contrary. There is no imminent reason for any counter evidence to arise. Warranted conventions have no necessary reason to develop by further use or experience. That is, the prediction

about the falling glass plate does not evolve as a result of further experience—it only gets more accurate.

The fourth, and more serious objection, is that when a convention changes, the agent's ability also changes. This is the case because ability relies on one's awareness of regularities of nature. Thus, one's awareness has a great impact on ability and, hence, there should be no difference between action-as-awareness and action-as-achievement. However, this hardly amounts to an objection. A convention acts as a tool, similar to the function of the wooden handle of the pickax. Action is about the mastering of tools and using them to achieve a goal. The change to a better convention (theory) can afford a greater command and coordination to attain a goal, similar to the design of a better wooden handle. However, the fact that ability and, hence, action-as-awareness partially depends on conventions, hardly makes theories of the same status as ability. If they are of the same status, they would be reciprocally dependent on each other. But this is not the case. While the change of a convention has ramifications with regard to ability, the development of ability should not have ramifications with regard to utility.

There is supposed to be a one-way street: If one's ability becomes better, it should not mean that one can now change the cosmos of facts according to the newly acquired ability. The cosmos of facts change only if new evidence upset the warranted assertions. While conventions enter as inputs, they are organized and shaped by one's frame in order to come up with a narrative or a story about the consequences of one's action.

In other words, if one gets better at striking the soil with a pickax it should not influence the convention about gravitational force captured by Newton's law of force.

This convention is influenced only by new upsetting evidence. The power to command skills to achieve a goal should not mean it is also the power to change the facts of the cosmos. Such a power or frame can only re-arrange the facts to provide one with suitable narrative. The failure to realize the one-way street between the two kinds of action (and the two kinds of beliefs), as argued below, leads to many paradoxes of rationality (from chain letters, Newcomb's Problem, to cults) and other confusions in the social sciences.

1.3.3 Objection Three: Conventions qua Frames because of Backward Induction

The backward induction paradoxes mentioned at the outset [Reny, 1992, Dupuy, 2000] include self-fulfilling prophecies, self-defeating beliefs (as in game theory), and self-immunized beliefs (as in Karl Popper's critique of Marxism, Darwinism, and Freud's psycho analysis) [Dupuy, 2000]. Backward induction reasoning is actually the dominance principle *in reverse* because all possible states are given, given the available data.

The trust game is another example of the backward induction paradoxes [Smith, 2003]. If one starts with the last stage and assumes that the agent would defect, the game would never take place. But if one who is taking the first move assumes that the other will not defect, the game may proceed to the end. Dupuy [2000] highlight the self-contradictory or self-refutational nature of such games. If one starts with the last phase, one must assume that there is a past, i.e., one must assume that he has reached a stage before the last one. One can reach the stage before the last one if one has already assumed that the other will not defect. Then why would that person assume that the other will defect in the last round?

Dupuy shows that predictions based on conventions concerning human society, affect the outcomes—supposedly similar to how frames influence the outcomes. Thus, as the argument may proceed; the proposed frame/convention distinction is untenable. Further, as the argument may proceed, predictions based on conventions concerning non-human nature such as rocks, planets and, non-human animals, do not influence the outcomes. As soon as one enters society, Dupuy appears to argue, one's action, insofar as based on a prediction, always changes the outcome. This makes it hard, Dupuy [2000, fn #15] argues, to test any prediction—which is not the case about the prediction of sunspots in nature. This implies that one should cut the cake along a fissure that supposedly separates nature (everything minus humans) and human society. To wit, John Searle [1999, chs. 4-5] seems to subscribe to such a way of cutting the cake: He distinguishes, at the entry point of theorizing, between observer-dependent phenomena, such as traffic rules, money, nation-state, political power, and property rights, which he calls generally “social and institutional reality,” and observer-independent phenomena, such as mountains, rivers, and non-human animals. Then, he distinguishes between the social sciences and the natural sciences *almost* along the same supposed fault. It is “almost” because Searle's theory of institutions goes deeper than the romantic social/natural distinction that can be traced to German thinkers as diverse as Wilhelm Dilthey, Immanuel Kant, Gustav von Schmoller, and Max Weber [see Brown, 1984]. Searle's theory goes deeper because he distinguishes, in turn, between traffic rules, part of what he calls “regulative rules,” and money and nation-state, part of what he calls “constitutive rules.” While the distinction between the two kinds of rules is useful as shown below, Searle seems unable to escape the nature/society distinction entailed by his

entry point of the difference between observer-dependent and observer-independent reality. Such a distinction springs from the subject/object dichotomy, which was questioned earlier. Aside from this, Searle ultimately views social reality as observer-dependent, created by collective intentionality where agents agreed to agree on what to agree, and so on, that particular things signify particular meanings such as money conventions and political authority. By lumping money conventions with political authority that frame the constitution of organizations, Searle confuses conventions with frames. In this lumping under observer-dependent reality, Searle cannot see the umbilical similarity between conventions about money, such as Milton Friedman's quantity theory of money, and conventions about gravity, such as Isaac Newton's law of gravity—and how this similarity differs greatly from frames.

Both Friedman's law of money and Newton's law of gravity are conventions because they try to explain the regularities of nature—which includes human society even when money is a human invention and gravity is not. The fact that money involves expectations about its price (i.e., interest rate speculations), which can fuel self-fulfilling prophecies (as Keynes argued), does not generate developmental processes of open-ended possibilities. The states of the world generated by such self-fulfilling expectations, even when they are self-feeding, are given and, hence, can be modeled as conventions not different from conventions about the likelihood of forest fires and paths of storms. To note, the self-feeding aspect of such Keynesian expectations create path-dependent, nonlinear dynamics analyzed by chaos theory. Such dynamics radically differ from learning where ability undergoes biological and psychological development. In self-

feeding Keynesian expectations, the states of the world are given, while biological/psychological development involves open-ended processes [Khalil, 1996a].

So, one should reject the nature/society distinction as the entry point of cutting the cake, as seems to be the entry point for both Searle and Dupuy. Given the implicit nature/society distinction, Dupuy seems to reduce conventions (as related to human affairs) to frames: There is only one kind of belief in human affairs, viz., belief-as-frame: Without distinction, all beliefs, insofar as they prompt action, undermine themselves. Dupuy recounts the story of the prophet Jonah and his argument with God. Jonah refuses to prophesy the fall of Nineveh (the capital of the Assyrian empire) because, as reactions to his prophesy, the people of Nineveh would repent, and the city would not fall. This would make him look like a mock prophet. Likewise, Dupuy recounts the story of *Zadig* by Voltaire, where the hermit murders the nephew of the generous hostess who fed the hermit and Zadig. When Zadig grills the hermit, the hermit argues that if the nephew had lived, he would have killed his aunt and later killed Zadig himself. Such a belief is self-immune because it stipulates an action that invalidates the prediction.

It is true that in human societies there are self-immunized and self-fulfilling conventions that one does not find in nature. The predictions of earthquakes and sunspots do not affect their likelihood. But does this mean self-fulfilling conventions are actually not different from frames? Let us revisit one aspect of the story of Job neglected at the outset. If Job concurs with his wife's belief that "God is unmerciful," and she turns out to be wrong, God would have known about it at the start of the game. Knowing that Job will be ungrateful (i.e., non-trustworthy), the game would unravel, like all other backward induction games [Reny, 1992, Dupuy, 2000]. But this is only one aspect of

Job's dilemma, viz., the justification of calamities *which have already taken place*. What about the other aspect, viz., the Newcomb aspect (as interpreted at the outset), which is *forward-looking*? This aspect tries to decide what to do next in light of the fact that God could still level calamities. This aspect justifies the use of Pascal's Wager.

Put differently, while Newcomb's Problem can be interpreted as backward induction [e.g., Dupuy, 2000], this captures only the backward-looking concern of the justification of past calamities. Insofar as one is concerned with forward-looking belief, conventions that are self-fulfilling are actually backward-looking and, hence, cannot be treated as frames that are forward-looking. Conventions that are self-fulfilling are actually backward-looking because they look at the past from the present state (i.e., the last stage of the game)—as perfectly illustrated in the backward induction solutions.

There is another reason why self-fulfilling conventions (backward induction paradoxes) do not belong to the belief-as-frame. The prediction prompted by a convention is conditional: If I distrust the person, he is going to reciprocate and is going to distrust me, which justifies my initial distrust. If I trust the person, there will be trust. So, the possible worlds are given, which causes two corner solutions—either full cooperation or total unraveling. The prediction, and the consequent action, does not affect the structure of the probability distribution. So, the belief in such games can be the product of dice throwing or accidental default state. Through experience the agent may become wise and less naïve and adopt a more realistic belief about the motivation of others. However, the possible states of the world are given, and which one is the actual state depends on accident or the default belief.

The self-fulfilling belief-as-convention is evident in the foundation of Keynes's [1937] notion of expectation—which is actually about hazard as understood here (i.e., subjective or objective expectations of events derived from given space of likelihood) [Khalil, 1997a]. Keynes's notion invites the idea that reality is merely the product of a set of mirrors—each mirror reflecting the images of the others. So, we have a set of conditional worlds that can be identified through the study of counterfactuals [see Tetlock & Belkin, 1996; Cowley, 1999]. Such a notion of expectation is appropriate if the object of study is mob psychology and speculative bubbles. But it cannot get a handle on the notion of the self as a moral autonomy with conscience, i.e., the self as having the ability to judge one's desires without the intrusion of public applause [Khalil, 1990b]. These self-fulfilling expectations are not different from Nash equilibria solutions to solve coordination problems. While one's action depends on what one thinks of the belief of the other, the universe of such solutions is given: One can only expect that the other is driving on the right or left, or one can only expect the market is bullish on a particular firm and its stocks. In fact, self-fulfilling conventions show the robustness of the transactional view, where one's expectation is contingent on the particular category that one holds. And such a category, while it influences the outcome, does not influence the probability distribution. Through learning, there will be an equilibrium standard, a settled rule of traffic, or a rule of fairness that assures the actuality of one state of the world out of the many possible, *but given number of states*.

Job, Superstitions and Newcomb's Problem

2.1 The Book of Job

2.1.1 The Wife's Dominance Principle

Imagine you were Job of the Old Testament and you felt that you were unjustly struck with one calamity after another. Would you surrender to bitterness and concur with your wife's belief that "God is unmerciful" or, in other words, "rewards are distributed according to favoritism, in total disregard of effort or merit"? The wife's feeling of victimization is justified following the "dominance principle" of standard game theoretic choice extended to the theory of beliefs. The bitterness is justified even following the softer, pragmatic criterion of John Dewey and Arthur Bentley [1999] because it is a "warranted assertion" in light of experience. According to Moses Maimonides [1956, p. 141], whose interpretation of the Book of Job I follow closely, the belief of Job's wife is also warranted if one follows the "theory of Aristotle." Following the dominance principle, pragmatism, or Aristotle's theory, the belief of Job's wife is rational.

Table 1 reconstructs the belief of Job's wife in a game-theoretic framework. The

	S_a: Available Information	S_p: Perfect Information
B_u: God is Unmerciful	Warranted Assertion	Unwarranted Assertion (Pr) Warranted Assertion (1-Pr)
B_m: God is Merciful	Unwarranted Assertion	Warranted Assertion (Pr) Unwarranted Assertion (1-Pr)

Table 1: Dominance Principle—The Reasoning of Job’s Wife

partition along the horizontal axis is cut along two states of the world: “available information” (S_a) and “perfect information” (S_p). The partition along the vertical axis is cut along two beliefs: “God is merciful” (B_m) and “God is unmerciful” (B_u). There is no question about the conclusion that, given S_a , B_u is a warranted assertion and B_m is an unwarranted assertion—even according to Dewey/Bentley’s softer sense of scientific validity. Job’s wife upholds the B_u belief while realizing that once information becomes perfect, it can support the same belief with (1-Pr) probability or reverse it with Pr probability. So, is it worthwhile to suspend one’s belief until perfect information becomes known? Not necessarily. On average, with the lack of any *a priori* knowledge of the nature of perfect information, Pr assumes the value of 50%. Consequently, given S_a state of ignorance, the two statements have *equal* likelihood of being warranted in S_p . The agent is indifferent between the two beliefs in S_p , while B_u belief is the more warranted on in S_a . So, irrespective of the state of the world or intention of the other player (God), B_u belief dominates B_m belief in both states of the world.

Job seemed to succumb to the bitter, but warranted B_u belief of his wife. In fact, he whined and complained as a wronged victim throughout the Book of Job. So, the expression of “the patience of Job” is a misnomer—probably based on reading the introduction only to the forty-or-so pages of the Book of Job. Ultimately, however, Job stopped whining and complaining when he listened to the lecture *especially* of Elihu, one of the four friends who urged Job to be patient, followed by a “Revelation” that buttresses Elihu’s lecture. Job eventually upheld the grateful, but seemingly unwarranted B_m , viz., “God is merciful”—agreeing with his four friends: Eliphaz, Bildad, Zofar, and Elihu:

[T]he five, viz., Job and his friends, agreed that the misfortune of Job was known to God, and that it was God that caused Job’s suffering. They further agree that God does no wrong, and that no injustice can be ascribed to Him [Maimonides, 1956, p. 437].

Given that the five men agree on the facts, were they irrational when they upheld the grateful, but apparently unwarranted belief that “God is merciful”? Not necessarily. A close scrutiny of the logic of their reasoning, they actually advanced three different principles of rationality upon which one can ground the counter belief that “God is

	<i>Beliefs-as-Conventions</i>			<i>Beliefs-as-Frames</i>
	Dominance Principle	Backward Induction Principle	Expected Utility Principle	Pascal's Wager Principle
Book of Job	Job's Wife: "God is Unmerciful"	Eliphaz/Bildad (Job's friends): "God is Merciful"	Zofar (Job's friend): "God is Merciful"	Elihu (Job's friend): "God is Merciful"
Chain Letters and other superstitions	"Do not Participate"	Participate	Participate	(Inapplicable)
Newcomb's Problem	"Take both Boxes"	"Take only Closed Box"	"Take only Closed Box"	"Take only Closed Box"

Table 2: Four Principles of Rationality

merciful." As Table 2 demonstrates, the three principles of rationality are: 1) "Eliphaz/Bildad's Backward Induction Principle"; 2) Zofar's "Expected Utility Principle"; 3) Elihu's "Pascal's Wager."

What is so attractive about the Book of Job is that what is justified by the most established theory of rationality is actually a bitter and repulsive belief, which justifies the agent to become jealous, whining, and complaining. However, what is justified by the other principles of rationality is the seemingly unwarranted belief that prompts the agent to be grateful, gracious upon failures, and thankful despite of difficulties or mistreatments.

However, which principle of rationality is true? Should Job be self-righteous but bitter, or calculating but grateful? There is no easy answer. At best, I can promise an analysis of the structure of the Book of Job that illuminates why conflict among

principles does not give rise to a general problem of indecisiveness or paralysis, which would totally undermine the completeness axiom of the standard theory of choice.

The way each principle of rationality confronts the dominance principle (Job's wife) gives rise to a different paradox. As Table 3 capitulates, the countering of the

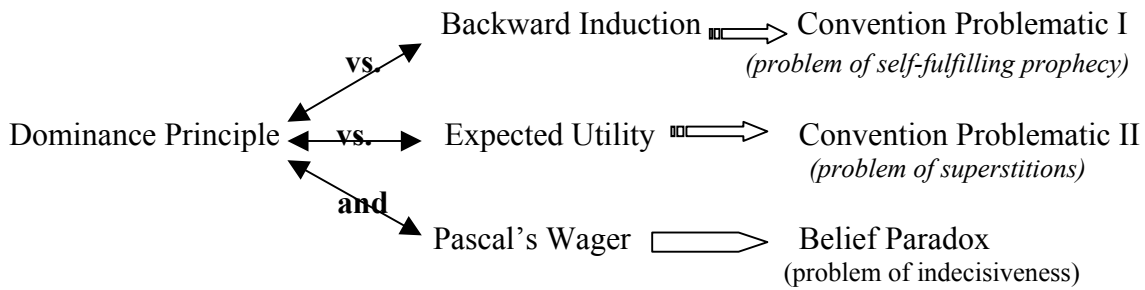


Table 3: The two Convention Problematics vs. the Belief Paradox

dominance principle by backward induction originates the problem of self-fulfilling prophecy, what is called here the “convention problematic I.”⁴ On the other hand, the countering of the dominance principle by expected utility theory generates the problem of superstitions, what is called here the “convention problematic II.” The way that Elihu’s Pascal’s Wager provides a different belief than what is provided by the dominance principle does not necessarily lead to an inconsistency—but it could lead to the problem of indecisiveness, what is called here the “belief paradox,” if the two kinds of reasoning are overlooked.

The problem of indecisiveness is ruled out by the completeness axiom, which is one of the two main pillars of the standard theory of rationality. According to the completeness axiom, when the agent faces with two options, A or B, he must have an opinion as to whether $A \geq B$, $B \geq A$, or both (i.e., $A=B$). Indecisiveness is defined as the inability of the agent to take such an opinion for whatever reason. Indecisiveness becomes a “problem,” as understood here, if it becomes intractable. It becomes intractable, as registered here, if the competing choices, A and B, arise from two conflicting beliefs that cannot be reconciled. Beliefs cannot be reconciled if the

⁴ The self-fulfilling prophecy gives rise to a solution or what is the best belief given one’s prediction and, hence, should not be confused with the Cretan liar paradox or Russell paradox [Russell, 1956], which gives no solution.

reasoning mechanisms behind them are seen as alternatives, which is how the dominance principle and Pascal's Wager principle (as reconstructed here) are seen. The view of the two principles as alternatives generates different beliefs that cannot be adjudicated, which would engender paralysis.

However, if the dominance and Pascal's Wager are seen as complementary or co-existing types of reasoning, the indecisiveness problem (the belief paradox) dissolves. In fact, the central thrust of this project is to show that the two types of reasoning are co-existing, originating the advanced thesis, viz., the two faces of beliefs: One face, grouped under "beliefs-as-conventions" in Table 2, is based on the dominance principle, backward induction, or expected utility. The other face, named "beliefs-as-frames," is based on Pascal's Wager. The belief paradox is resolved by highlighting how Elihu's Pascal's Wager reasoning—rather than Eliphaz/Bildad's backward induction or Zofar's expected utility reasoning—is substantially different, in the sense of not being the basis of conventions, from the dominance principle used by Job's wife.

I still want to discuss the challenges posed by backward induction and expected utility principles. Eliphaz's backward induction should prove to be of special importance for the analysis of repeated but finite cooperative games and for understanding Keynesian expectations. In contrast, Zofar's expected utility reasoning should prove to be of special importance to distinguishing superstitions and magic from faith—whereas "faith" is defined here as being hopeful about one's potential. Once we get out of our way the contradictory bases of conventions, we can analyze the two faces of beliefs whose confusion is at the origin of the belief paradox.

2.1.2 Eliphaz/Bildad's Backward Induction and the Problem of Self-fulfilling Prophecy

Bildad/Eliphaz's argument supports a belief that is contrary to the belief of Job's wife (dominance principle). According to Maimonides, Bildad's reasoning corresponds to the reasoning of the Mu'tazillah, an Islamic philosophical school. For Bildad, one should be patient because if one is innocent, one will definitely be rewarded in the future according to the strict scales of justice. But if one pushes the argument further, as Eliphaz does, the strict scales of justice means that Job must have sinned or just about to sin.

Eliphaz appears to use the backward induction principle when he follows, according to Maimonides [1956, p. 440], the tenets of the Scriptures concerning "strict justice" as illustrated in the "eye for eye, and tooth for tooth" rule. Let us reconstruct Eliphaz's reasoning: Given that Job concurs with "strict justice" and given that "God is merciful," one can only conclude that Job has committed a sin. Given that all five men agree that Job did not commit a sin *yet*, one can only conclude that *to agree with the belief of Job's wife that "God is unmerciful" would be the sin*. This conclusion invokes a set of problems known generally as the "backward induction paradoxes," which include the paradoxes of self-fulfilling prophecy, self-refutation, and auto-immunized beliefs [Reny, 1992; Dupuy, 2000]. To concur with the wife's belief would *retroactively* justify all past calamities: The omniscient God would have known in the past about the upcoming ungratefulness of Job. Thus, according to the backward induction principle, God has simply leveled the punishment ahead of time. The calamities that seem unjust *prior* to the wife's belief are actually just *if* Job concurs with his wife.

As reconstructed in Table 4, backward-induction, insofar as it entails self-

	<i>S_a</i>: Available Information	<i>S_r</i>: Reflexive Information
<i>B_u</i>: God is Unmerciful	Warranted Assertion	Unwarranted Assertion
<i>B_m</i>: God is Merciful	Unwarranted Assertion	Warranted Assertion

Table 4: Backward Induction—Eliphaz’s Reasoning

fulfilling prophecy, the choice of a belief creates its own validation. While the vertical axis is partitioned along the two competing beliefs (B), the horizontal axis is partitioned between “available information” (S_a) and “reflexive information” (S_r). Reflexive information amounts to the following:

$$S_r = S_a + B$$

If B is B_u (“God is unmerciful”), God would have known and, hence, the person would have deserved the punishment for being ungrateful. So, in S_r state, B_u would be an unwarranted assertion. In contrast, if B is B_m (“God is merciful”), God would rectify his past “injustices” and, hence, the person would, in the end, feel that he has not received a rotten deal. So, in S_r state, B_m would be a warranted assertion. Given backward induction afforded by the S_r state, the agent would choose the B_m belief, while in S_a state the agent would choose the B_u belief. Given that the S_r state is more comprehensive than the S_a state, the agent would favor the B_m belief over the B_u belief.

Thus, backward-induction supports a belief that contradicts the belief of Job’s wife who only uses available information as suggested by the dominance principle. This

contradiction is dubbed here the “convention problematic I.” This problematic, or more popularly the self-fulfilling prophecy paradox, is replicated in cooperative games, such as Nash equilibria. Nash equilibria can be the basis for the analysis of conventions such as standards of measure and rules of traffic [e.g., Young, 1996, 1998]. Also, self-fulfilling prophecy paradox is replicated in non-cooperative games, such as repeated, finite prisoners’ dilemma games under the condition of common knowledge. For instance, in the iterative game between the firm and employees, if the firm acts with kindness, the employees would expend greater effort [Leibenstein, 1987]. Likewise, in the trust game as Vernon Smith [2003] and his collaborators [e.g., McCabe *et al.*, 2003] show in their experiments, if the prediction that a partner will defect is based on a convention that is common knowledge, the prediction creates its own data; i.e., the partner would defect. Smith and his collaborators recognize that in some games, such as in prisoners’ dilemma, strategy depends totally on outcomes, as the dominance principle specifies. But in other games, such in the trust game, one's strategy depends on what one player thinks the intention of the other, viz., would he reciprocate cooperation or would he defect.

This problem of self-fulfilling prophecy is not limited to strategic action (game theory). It also informs greatly John Maynard Keynes’s [1937] notion of “animal spirits” that fuel self-feeding expectations, which may explain the business cycle [Shleifer, 1986]. Nonetheless, Keynes’s notion of expectation is similar to backward induction in game-theoretic setting. The agent is concerned with explaining the past from the final stage where prediction of the final stage is common knowledge. The backward induction principle in both strategic action and market action involves the application of the dominance principle *in reverse*, i.e., reasoning as if the future lies in the past.

Despite the similarity in the structure of the dominance principle and the backward induction principle, they generate inconsistent beliefs. Nonetheless, given the similarity of the two principles, the beliefs are classified as “beliefs-as-conventions.” They are called conventions because they are descriptions of regularities of nature, which include one’s social environment.⁵ The puzzle of inconsistent beliefs arising from the dominance *versus* backward induction principles is called here the “convention problematic I.”

The convention problematic I is the outcome of the role played by prior categories: We cannot resolve conflicting descriptions of regularities of nature by a simple testing procedure because the prior belief generates, at least to some extent, the data. This convention problematic I informs the life work of Smith [2003]. It is also the prime focus of Dewey and Bentley’s [1999] pragmatic philosophy, *viz.*, the “transactional view,” which is discussed extensively below. I will show that the transaction view informs, in fact, much of what is known as institutional economics.

I am getting ahead of my story already. While I will show how Dewey and Bentley solve the convention problematic I, the main thrust here is something else entirely. The thrust is rather to solve another and, I must register, a greater problem, *viz.*, the “belief paradox.” The belief paradox challenges much of the foundations of heterodox institutional economics. The belief paradox is generated by the clash of the

⁵ The choice of terms is not easy. With the case of the term “convention,” it may prove to be cumbersome. But I wanted a term that is general enough to denote two things: regularities of nature (about how plants grow or when to expect rainfall) and regularities of the behavior of other human beings (which can be about standards--from traffic rules to money and even how to use of terms--to rules of fairness to avoid prisoners' dilemma).

dominance principle, the backward induction principle, and the expected utility principle, on one hand, with the Pascal's Wager principle, on the other.

2.1.3 Zofar's Expected Utility Principle and the Problem of Superstitions

Expected utility theory also supports a belief that is contrary to the belief of Job's wife (dominance principle). According to Maimonides, Zofar's reasoning corresponds to the thinking of Asha'riyah, an Islamic philosophical school. For Zofar, as Maimonides recounts, one cannot question the reason, justice, or wisdom of "Divine Will"—one just has to accept the results with *blind obedience* because "we are unable to fathom the depth of His wisdom"[Maimonides, 1956, p. 440]. I want to show that if one accepts *even with a very small probability* the hidden wisdom of Divine Will, expected utility theory leads one to adopt the unwarranted statement that "God is merciful."

The catch here is that the wisdom of Divine Will has to be adopted as a *blind obedience*. The adoption can be seen as innocuous if it is wrapped with the qualification that it involves a very small probability. However, as shown below, the blind adoption is far from innocuous. In fact, the adoption of the blind obedience involves two pitfalls: First, one cannot consequently distinguish superstitions from scientifically warranted assertions. Second, one cannot consequently delineate superstitions from faith understood as being hopeful about one's potential.

As reconstructed in Table 5, expected utility theory, by definition, takes into

	S_a: Available Information	S_s: Surprise Information (Pr)
B_u: God is Unmerciful	Warranted Assertion	Unwarranted Assertion
B_m: God is Merciful	Unwarranted Assertion	Warranted Assertion

Table 5: Expected Utility Theory—Zofar’s Reasoning

consideration the states of the world. While the vertical axis is partitioned along the two beliefs, the horizontal axis is partitioned between “available information” (S_a) and “surprise information” (S_s). By definition, once surprise information arrives, the agent would definitely switch his assessment of the belief under focus. Surprise information is assumed, by blind obedience, to appear with Pr probability, whereas $Pr > 0$. As before, in S_a state, the agent would choose the B_u belief, while in the S_s state, the agent would switch to the B_m belief.

But is it worth the trouble to subscribe to the B_m belief while one is S_a state? While in S_a state, the agent believes blindly that surprise information may arise with Pr probability. According to expected utility theory, it is worthwhile adopting B_m belief under this condition:

$$(1 - Pr)U(B_m) + PrU(B_m) > (1 - Pr)U(B_u) + PrU(B_u)$$

whereas $U(\cdot)$ is the utility derived from action based on the belief (B) which is under focus. So, even if Pr is miniscule, it would be worthwhile to uphold B_m if the utility in the S_s state is sufficiently large. Given that infinite utility may arise from upholding B_m in S_s state, the agent would adopt the B_m belief while in the region of darkness, i.e., while in S_a state. In fact, this is the standard recasting of Pascal's Wager—which is disputed in detail below.

I want here to stress that $Pr > 0$ —a necessary condition for inequality above to work—is given. One only needs to have blind obedience that $Pr > 0$ to generate the scientifically unwarranted belief B_m as “warranted.”

This opens the floodgate for any outlandish belief to gain “legitimate” standing. The agent can promote any superstition as “warranted” only by letting someone admit that Pr is non-zero. In fact, it is argued below that the standard interpretation of Pascal's Wager along expected utility theory ultimately fails to draw a line between superstitions and the faith under focus, viz., whether (Job's focus) “God is merciful” or (Pascal's concern) whether “God exists.”

In any case, expected utility theory, with the blind obedience that $Pr > 0$, gives credence to a belief that contradicts the belief advanced by Job's wife on the basis of the dominance principle. This contradiction is called here the “convention problematic II.” This problematic can also be referred to as the problem of superstitions. The convention problematic II is discussed in relation to the standard interpretation of Pascal's Wager as well as in relation to Robert Nozick's two solutions of Newcomb's Problem.

2.1.4 Elihu's Pascal Wager and the Problem of Indecisiveness

2.1.4a Is Faith Blind?

The Book of Job involves a long rendition of arguments made by his four friends of why Job should not listen to his wife and, hence, should stop whining. The Book of Job highlights in particular Elihu's argument as the proper response to the bitter, but warranted assertion of Job's wife that "God is unmerciful." Elihu basically stressed the notion of faith, generally called here "belief-as-frame." In contrast, the other three friends basically stressed warranted assertions, i.e., beliefs-as-conventions, as if the issue of whether "God is merciful" is a scientific proposition.

The central argument here is that beliefs have two faces, frames and conventions. Neither frames can be reduced to conventions, nor can conventions be reduced to frames. Further, the two faces of beliefs do not stand symmetrically to each other. Action unites them in an asymmetrical fashion. But the central argument of this section is to show that Elihu follows Pascal's Wager and, in turn, show that Pascal's Wager is not about expected utility theory as commonly misunderstood in the literature.

If successful, it means that Pascal's Wager differs from the other three principles: dominance, backward induction, and expected utility principle. These three principles provide grounds to diverse beliefs grouped under the term "beliefs-as-conventions." In fact, the main thrust of this project stands or falls insofar as it succeeds in distinguishing belief-as-convention (subject to empirical verification) from belief-as-frame (faith). The confusion of the two faces of beliefs is called the "belief paradox"—and the resolution of the paradox is the spinal core of this project.

Neither the backward induction principle nor expected utility theory can be the reason why Job ultimately rejects his wife's belief. Concerning backward induction, the

game has no final round from which to conduct backward induction. Even when death is around the corner, Job is also concerned with his posthumous reputation—at least as judged by his esteemed four friends. Concerning expected utility, Job did not blindly believe that “God is merciful.”

How did Elihu and, consequently, the Book of Job use Pascal’s Wager to justify the belief that “God is merciful”? Pascal’s Wager is named after Blaise Pascal who offered a game theoretic argument for the belief in a Christian God. Similar to Pascal as shown in detail below, Elihu did not invoke empirically verified grounds for the different probable states of the world involving God exists or does not exist. Elihu in fact did not appeal to more facts in Job’s life, which happened or about to happen, in order to buttress the statement “God is merciful.” Elihu was fed up and even angry with the appeal to empirically corroborated reasoning by Job and the other three friends of Job. Elihu was the last one to speak and to provide grounds for why Job should be patient and stop complaining and whining. Elihu waited to the end out of deference to the other three friends of Job who are older and supposed are wiser. But to Elihu’s great disappointment, the three friends did not provide the ultimate reason for why Job should be patience and maintain hope and tenacity.

Maimonides [1956, pp. 441-3] argues that while Elihu repeated the observations made by the other men, he introduced one “new idea.” Namely, Elihu maintained that angels can intercede and pray to save the life of a man who is on deathbed. But they can intercede only twice, or maybe three times, during one’s life. In his angelic intercession “metaphor,” according to Maimonides, Elihu wants to demonstrate the precariousness of human life vis-à-vis the power of nature—not different from the precariousness of the

lives other living creatures. Even angels, with their prayers, cannot manage *at will* the living process of an organism: Throughout one's long life, angels can intercede three times at best. Maimonides seems to state, by stressing how divine management differs from man's management of artifacts, that man can manage and manipulate his artifacts better than how angels can manage and manipulate living processes.

So, it seems that God cannot be blamed for calamities, and we should be grateful that there is life to start with. For Elihu, according to Maimonides, we have to have hope that the processes of life will eventually turn in our favor. These processes cannot guarantee every outcome because the management of nature by God differs from how we humans control and manage artifacts. While we understand and move artifacts at our own will, divine management does not work in the same way. This can be seen as stating that while organisms develop, the challenges they face and even illness and death are part of the theater of nature. Even when calamities stunt the growth of some organisms, others prosper and procreate. So, one has to have faith that, despite calamities, the processes of nature will proceed and organisms will develop.

Faith, as defined here, is basically about hope. Hope acts as the *frame* that the organism needs in order to undertake forward-looking action. Of course, the details and exact content of faith is not the issue. What is at issue is the generic sense or orientation that action has the *potential* to produce something good. While Job did not explicitly use his belief that "God is merciful" for any explicit action, he needed that frame in order to have hope and look forward for another day. So, faith in nature, faith that despite bad luck, tomorrow would be open for further development of one's potentiality, is not an arbitrary belief that one has to follow blindly, as the case with Zofar's expected utility

theory. Job can look around and see that others collect the pieces of their shattered life in stride and continue to work, till the land with a pickax, improve on one's technology and ability, take produce to the market, and so on. Such faith is an essential ingredient to produce and to develop as a living entity. So, such faith is not arbitrary or supported by self-fulfilling prophecies as the case with superstitions. It is rather constitutive of forward-looking action.

As such, the belief in one's potential, the belief in the living process of organisms, helps one to withstand calamities. The belief does not entail that calamities cannot happen to "good" people but rather that, if one believed that "God is merciful," calamities can be seen as part of the living process and, hence, one can learn more about the wisdom of survival.

There is a great benefit from an apparently unwarranted belief that goes against all evidence, as in the case of Job's predicament. In fact, evidence about calamities cannot be invoked as a criterion for assessing faith. Once the benefit of faith is witnessed in terms of its forward-looking benefits, faith is bolstered despite past performance. As such, faith is not bound to what actually happened, but to what potentially could happen.

Although Elihu does not enter explicit or implicit calculations, the benefits that one expects from holding faith concerning one's prospects out-weighs the no-faith option. Such expected benefits, to be clear, is not a scientific proposition based either on self-fulfilling prophecy or expected utility theory. Rather, it is a belief in something that can have enormous benefit in terms of growth and development. I should argue that Pascal's Wager, as understood here, can make the logic of faith clearer.

To show this, I need first to dispel the standard, expected utility interpretation of Pascal's Wager. There is a long debate as to whether Pascal's Wager as understood by expected utility theory corresponds to what Pascal [1966, 1999a,b] had actually scribbled in two pages in his 1670 posthumously published book, *Pensées*. I do not discuss in any detail of what Pascal might have intended. I rather want to discuss what Pascal should have intended if Pascal's Wager to avoid inconsistencies invited by the expected utility theory. To get to this end, I need not review here the long philosophical scholarship on the moral and theological ramifications of Pascal's Wager [e.g., Cargile, 1966; Martin, 1983; Rescher, 1985; Jordan, 1994; Mougin & Sober, 1994; Sobel, 1996; Schlesinger, 1999].

Stated simply, Pascal's Wager argues that it is best to believe in X—who is a Christian God for Pascal or can be any entity that provides hope—as long as there is a belief qua hope that there is at least some doubt that X exists. The qualification is needed, as the term “doubt” is explained below, in order to distance Pascal's Wager from expected utility theory that admits outlandish beliefs or superstitions as “warranted.” Stated formally, and apparently similar to expected utility theory, if X exists, the believer would receive salvation, but would have toiled with a pious life. However, if X does not exist, the believer would have only suffered from leading a pious life. On the other hand, if X exists, the non-believer would receive damnation, but would have enjoyed the worldly life of libertine. However, if X does not exist, the non-believer would have only gained the libertine way of life.

Table 6 provides a formal reconstruction of Pascal's Wager. The partition

	S_n: X Not	S_i: X Is (Po (B))
B_n: Belief Not	$U_{nn} = U(0, \text{Libertine})$	$U_{ni} = U(\text{Damnation}, \text{Libertine})$
B_i: Belief In	$U_{in} = U(0, \text{Piety})$	$U_{ii} = U(\text{Salvation}, \text{Piety})$

Table 6: Pascal’s Wager—Elihu’s Reasoning

consists along the horizontal axis of two states of the world: “X Is” (S_i) and “X Not” (S_n). The partition consists along the vertical axis of two beliefs: “Belief In” (B_i) and “Belief Not” (B_n). The role of experience in the formation of the two beliefs is what makes Elihu’s reasoning different from all the previous ones, as explained shortly. The utility function (U) is assumed to be positive with salvation and libertine, while U is assumed to be negative with damnation and piety. For the agent to choose B_i , the following condition must be met:

$$(1 - \text{Po}(B))U_{in} + \text{Po}(B)U_{ii} > (1 - \text{Po}(B))U_{nn} + \text{Po}(B)U_{ni}$$

whereas $\text{Po}(B)$ is the *potentiality* of S_i state, which depends on the adopted belief (B).

The recasting of Elihu’s Pascal Wager in terms of “potentiality” seems deceptively identical to Zofar’s expected utility construction in terms of “probability.” However, aside from the choice of terms, the two kinds of likelihood are conceptually different in one remarkable way—which is the central thesis of this project. Specifically, I want to show that Elihu’s reasoning is about belief-as-frame (faith) which differs from belief-as-convention.

To recall, $Pr > 0$ in Zofar's expected utility construction is given or, specifically, posited by *blind obedience* that some "surprise information" will appear. Such blind obedience would justify any unwarranted belief even if Pr is very small—as long as the expected utility is large enough. Such blind obedience is adopted for no reason other than itself, which opens the floodgate for the justification any superstition.

In contrast, $Po(B)$ in Elihu's Pascal's Wager is neither given nor assumed to be positive. Rather, $Po(B)$ is a function of belief (B): While belief depends on the above inequality condition, $Po(B)$ depends on belief in the following way: The adopted belief, as expressed by the consequent experience, acts as the basis of one's valuation of potentiality likelihood, which in turn influences the adopted belief. In this manner, the belief under focus is called belief-as-frame (faith), which differs from belief-as-convention reasoned in Zofar's expected utility theory.

Still, on the other hand, how does Elihu's Pascal's Wager differ from Eliphaz/Bildad's backward induction that occasions conventions responsible for self-fulfilling prophecy? To wit, if $Po(B)$ is a function of belief, how does this differ from self-fulfilling prophecy where the possibility of the final stage depends also on the initial belief? In backward induction, there is no experience that mediates the transaction between one's valuation of the potentiality likelihood, on one hand, and the adopted belief, on the other. In contrast, in Elihu's reasoning, or my interpretation of Pascal's Wager that would distance it from the problem of superstitions, the adopted belief necessarily involves experience, or a living process, that itself formulates the potentiality likelihood. Simply put, to save Pascal's Wager from expected utility theory and the

problem of superstitions, there is no strict wall separating potentiality likelihood from the experiential belief (i.e., frame or faith).

To elaborate, in backward induction, there is no living process because time is collapsed as if the choice is among spatial options, where each option reflects the other in a mirror-like fashion. This gives rise to self-fulfilling prophecy, where the agent reasons that if he chooses the warranted assertion “God is unmerciful,” God would have known about his infidelity and, hence, God is justified in inflicting the calamities in the first place. So, the assertion is no longer warranted upon reflection from the final round. The same limited options arise in the trust game, where each type of prediction justifies itself. There is no experience involved here in the sense of undertaking challenging tasks that justify the switch from one kind of belief to another. The options in the trust game or in backward induction in general are limited by the way they reflect and co-determine each other.

In contrast, in Elihu’s Pascal’s Wager, potentiality likelihood is never seen from the standpoint of a final round for the simple reason that the living process has no final round. An agent can stay hopeful that the next experience or action, carried by the agent or by his descendants or beneficiaries, would vindicate the valuation of his potentiality likelihood. This hopefulness amazingly means that, in the process, the agent is undertaking actions that improves his ability and, hence, vindicates the hopefulness. Such a developmental experience, in turn, acts as a *basis*, but never as a predictor, of the valuation of potential likelihood. In short, this process is not about backward induction because it involves the growth and development of the organism, which is not the case with backward induction. As shown below, in light of the discussion of why the

risk/uncertainty distinction of Frank Knight must fail, the process of development means that the potentiality likelihood associated with belief-as-frame cannot be pinned down (i.e., made quantifiable) as in the case with probability distribution in the cases of belief-as-convention.

With regard to Job, or how Maimonides illustrates Elihu's reasoning of why Job should maintain his belief that "God is merciful, Elihu reasons that one should ground such a belief on the observation of the success of so many organisms despite the calamities and challenges they face. The observation should, but never necessarily, provide the agent with a non-quantifiable faith that he might as well succeed and, hence, should not lose hope in trying, which develops his *potential* ability.

2.1.4b A Critique of Standard Recasting of Pascal's Wager

Pascal's Wager should not be recasted along the expected utility principle—if one wants to argue that Pascal's Wager is not a justification for superstitions. In fact, to recast Pascal's Wager along expected utility principle provides a reason of why one should not believe in anything unless it is empirically warranted because, otherwise, it would be not different than superstitions [Martin, 1983]. Insofar as some beliefs that are about hope concerning forward-looking action (i.e., belief-as-frame), where the criterion of empirical relevance is irrelevant, Pascal's Wager or at least Elihu's reasoning should be saved from the expected utility interpretation.

To buttress this claim, let us review the standard construction of Pascal's Wager as expressed in Ian Hacking [1972]. Hacking argues that there are three "argument forms" of Pascal's Wager. While Hacking finds the three argument forms to be valid

from the logical standpoint, he questioned the premises. Following modern decision theory, the three forms are the “dominance,” “expectation,” and the “dominating expectation” arguments. I want to review them in order to show that Pascal’s Wager is unrelated to them—if Pascal’s Wager is to avoid tautology or the taint of supporting superstitions.

The argument from “dominance” means that one perform an act or adopt a belief irrespective of the states of the world or what are the intentions of the other players. To adopt B_i on the basis of “dominance,” we must assume that piety and libertine are neutral actions, i.e., neither has any effect on utility. Apparently, Pascal realized that the “dominance” argument would be like playing tennis while the net is down. Given that piety is undesired while libertine is desired, the agnostic must take into consideration the states of the world, which he assigns $1/2$ chance to each state. To adopt B_i on the basis of “expectations,” the salvation must generate a utility high enough to offset the disutility of piety or to offset the foregone libertine. However, Pascal realized that $P_i = 1/2$ is too high for most agnostics. So, he resorts to “dominating expectation” argument and admits that the maximum P_i (X exists) upon which all agnostics would concur is very miniscule. But given $P_i > 0$, the condition set above for believing can be easily met. Salvation has *infinite* utility following the infinity of life after death, while the sacrificed libertine (or incurred piety) is as finite as one’s life span.

Hacking dismisses the three argument forms: “The most dubious premiss [sic] is the partition, with its concomitant assignment of utilities” [Hacking, 1972, p. 190]. However, Hacking submits the premises to empirical corroboration, i.e., scientific testing, which Pascal refuses to admit, as Hacking amply notes throughout his essay. As a result

Hacking confuses Pascal's Wager with the scientific procedure of verification that characterizes beliefs-as-conventions—a confusion which is also committed by Robert Nozick [1969] in relation to Newcomb's Problem.

What I rather find to be the most dubious in Pascal's Wager is the assumption, with which all agnostics concur, viz., $P_i > 0$. This assumption exposes the tautological character of Pascal's Wager. Pascal's Wager assumes what it tries to prove: It must assume that there is a possibility that "X Is" to prove that one must adopt the belief in X (B_i). Thus, Pascal's Wager cannot win over an atheist defined as someone who believes $P_i = 0$, i.e., convince him with the belief that "X Is."

However, we should not rush and dismiss Pascal's Wager because of tautology. It would be tautological, and Pascal's Wager should be doomed, if the belief under focus is about scientific, empirical testing. Pascal refused to appeal to any feasible scenario of empirical cause-and-effect—which makes Pascal's Wager different from the scientific reasoning followed by Job's wife (dominance principle), by Eliphaz/Bildad (backward induction), and by Zofar (expected utility) do not apply. For Pascal, or at least for Pascal's Wager to avoid tautology, the "X Is" proposition is not a scientific proposition and, hence, Pascal's Wager should not be confused with the scientifically based the precautionary principle.⁶ In fact, Pascal [1999a,b] intentionally refused to examine any

⁶ The precautionary principle is advocated in debates concerning environmental policy, health sciences, and genetic engineering. For the precautionary principle, it is important that one's hypothesis of how nature works, although tentative, to be based on a plausible story of cause-and-effect. This is not the case with Pascal's Wager.

experimental data bearing on the existence of a Christian God. As Elihu has maintained, the belief in the prosperity and growth of one's life process is not a scientific proposition to start with. The belief is rather about faith: Once one has the doubt about his existence, and that benefits hinge on the belief that removes such doubt, then it is worthwhile to adopt the experiential belief EB_i .

The proposed idea of two faces of beliefs means that faith *qua* belief-as-frame is distinguishable from scientific propositions that underlie belief-as-conventions. The proposed idea of two faces of beliefs help us avoid the conflation of superstitions with frames, on one hand, and with conventions (scientific theories), on the other. If B_i is about empirically-warranted assertions ("beliefs-as-conventions") as Job's wife, Eliphaz/Bildad, and Zofar have assumed, what prevents one from using Pascal's Wager to support another class of beliefs known as superstitions? Specifically, the expected utility argument form used by Hacking opens the floodgates so widely that it allows through *any* vessel, including superstitious beliefs. The problem with expected utility interpretation is not only that "X" could refer to the Hebrew God, Buddhist God, or Muslim God—as Diderot derisively remarks [Hacking, 1972, p. 188, n. 9]. The bigger problem with the expected utility interpretation is that there is no reason to reject any superstition—as long as one assigns at least a non-zero probability for a state in the world in which the superstition is supposedly valid.

Put differently, expected utility theory can only explain the persistence of the belief *that is already* upheld. It cannot explain the origin of the belief itself. To save Pascal's Wager from travesty or inconsistency, i.e., as the basis to justify superstitions, we have to distance it from the expected utility interpretation.

2.1.4c Can Faith be Based on Convenience?

The offered interpretation insinuates another problem for Pascal's Wager. Faith is about deep commitments concerning important issues, while Pascal's Wager can only afford beliefs that are based on what seems to be as convenience. Faith is about commitment that constitutes one's core concept of the self, while Pascal's Wager, as Leibniz expressed, is not:

This argument [Pascal's Wager] shows nothing about what one ought to believe, but only how one ought to act. That is to say, it proves only that those who do not believe in God should act as if they did [quoted in Hacking, 1972, p. 191].

To start with, Leibniz is a rationalist about believing, while Pascal is not. For Pascal, one does not choose to believe or not to believe while standing outside of action. For Pascal, one chooses a way of life and a pool of friends in a way that reflects one's belief--whereas the way of life and the pool of friends, in turn, reinforce the belief. So, the agent acts in light of believing, and one believes in light of action. This idea resonates with how at least William James and other pragmatic theorists view a living belief [James, 1927; Smith, 1978] .

To put it differently, Leibniz's objection is no objection if one thinks that beliefs are formed through experience and through transactions with the chosen pool of people—especially if the issue is of deep importance. So, while faith is not based on pure convenience as Leibniz argues, it is not based on pure rationalist grounds as Pascal

argues. Rather, belief-as-frame (faith) is formed during action, where one's valuation of potential likelihood is never isolated from the belief and the consequent experience.

2.2 Chain Letters and other Superstitions

Superstitions range from chain letters, taboos on uttering words such as “cancer” and “death” that may jinx one's fortune, to beliefs in the “evil eye” and “luck” as a purposive agent that should not be displeased. Many superstitions, such as the ones that inform hygiene practices, may have some scientific support. Other superstitions may have support that has risen simply because of self-fulfilling prophecy [Elster, forthcoming]. In any case, what is amazing about superstitions and magic is that they have the structure of “scientific hypothesis.” So, to define superstitions, they are scientific hypotheses that do not have empirical corroboration or, if they do, they fail to provide some testable mechanism of causality. To keep the discussion simple, I only discuss here superstitions in the sense of empirically refuted scientific hypotheses.

Given the evidence, the belief that you would be lucky if you participate as instructed by a chain letter is clearly unwarranted—other than on the grounds of self-fulfilling prophecy. And still agents participate in chain letters based on the very slight probability that the unwarranted belief is true and, in addition, given that the cost of participating in chain letters is minimal. So, how do superstitions differ exactly from faith?

Superstitions and faith share a common, although an artificial feature. Namely, both are unwarranted beliefs if examined from the standpoint of the scientific method. Therefore, following the dominance principle, you should not waste the two minutes it

takes to send the chain letter to your acquaintances or the three seconds it takes to avoid walking under a ladder in the dark. However, there are two important, interrelated differences that show why you should not dismiss faith in the same way you dismiss superstitions. First, faith should not be subjected to the scientific method as if it is a convention—which was Elihu’s point. Faith does not pretend to be a convention to start with. As mentioned earlier, Pascal [1999a,b] deliberately tied his hand and did not appeal to evidence. Otherwise, faith would not be different from a convention and, hence, the belief of Job’s wife would be the only valid belief from the scientific standpoint.

Second, insofar as Pascal’s Wager is used to justify faith, it cannot be used to elevate superstition, or any belief-as-convention that is subject to verification, to the status of belief-as-frame (faith). Pascal Wager’s, if to be distanced from superstitions, is inapplicable to the ground of conventions to start with. Pascal’s Wager should be employed when the belief at stake is constitutive of what it means to be behaving, breathing, and procreating organism. It is appropriate to base a belief on Pascal’s Wager, although it cannot be supported by evidence as in the case of Job’s faith, *if it is constitutive to the transaction of the actor and nature*. The belief at which Job, with the help of Elihu, arrived expresses respect for the ability of organisms to survive despite the so many calamities that confront them.

So, we cannot use Pascal’s Wager to buttress or justify *any* belief. The belief has to pass the criterion of whether it involves the behaving, breathing, and procreating organism at its center. Otherwise, Pascal’s Wager would be a travesty. It would offer an unsupervised gate, that make up the constitution of the individual, through which any

superstition can be driven through as if it is about belief-as-frame, i.e., a belief needed for the constitution of the individual. There would be no criterion upon which to select which belief to be allowed inside the gate and which belief to be kept outside.

To elaborate, to apply Pascal's Wager, the belief must concern the *potentiality* of the biological process entailed by the production as, e.g., when a farmer uses the pickax to till the soil. Only through production does the organism grow and develops. Faith informs production given that it is future-looking action where the belief-as-frame is constitutive of the action itself. When Job came to the conclusion that he, despite all the calamities, is grateful to be alive, the belief expresses faith in the future and, hence, becomes a constitutive element in the reorganization of his forward-looking plans.

In contrast, a superstitious belief, such as magic, involves purely beliefs about cause-and-effect that have the structure of a scientific hypothesis. Such a scientific structure can even gain some empirical support simply because of self-fulfilling prophecies [see Elster, forthcoming]. For instance, let us suppose that person A believes in the "evil eye" and A also believes that spectator B has the evil eye. Then, A would become sick or stuck with bad luck more often after encountering B than on other occasions. Here A's beliefs set the stage for A to become sick more often in particular situations, which confirms the beliefs. The beliefs simply generate their own data. To eliminate such questionable evidence generated by self-fulfilling prophecy, usually referred to as the "placebo effect," medical experiments on drugs are usually run with care using false pills of which the subjects are not aware.

A superstitious belief can be dispelled with the same ease after careful experimental set-up that offsets the placebo effect. In such a way, the superstitious belief

cannot have it both ways: A belief that has the structure of belief-as-convention (i.e., scientific hypothesis) cannot simultaneously appeal to Pascal's wager acting as if it is belief-as-frame.

2.3 Newcomb's Problem

Newcomb's Problem, widely discussed in philosophy literature, is arguably the mother of the belief paradox:⁷

Newcomb's Problem: There is an omniscient "Being," whose ability to predict your action has proven itself again and again. In fact, he has never failed in the past in his prediction. He offers you two boxes, one is open and contains \$1,000 and the other is closed. If he predicts that you will claim both boxes, he would leave the closed one empty. However, if he predicts that you will claim only the closed box, he would leave in the closed one \$1,000,000. While alone and unknown to you, the omniscient "Being" makes his prediction, acts accordingly, and then he invites you into the room. What should you do?

There are many interpretations of Newcomb's Problem, which are not the main concern here [e.g., Levi, 1975, 1982; Broome, 1989; Nozick, 1995; *passim* Campbell & Sowden, 1985]. I want rather to show how these interpretations parallel the three principles used to justify beliefs-as-conventions: 1) dominance principle (Job's wife); 2)

⁷ The paradox is named after the physicist William Newcomb, and first presented and discussed in Robert Nozick's 1969 essay [Nozick, 1969, 1995, pp. 41-50]. For a popular presentation, see Martin Gardner [1996].

backward induction (Eliphaz/Bildad); 3) expected utility theory (Zofar). I want to argue that Elihu's Pascal's Wager can recast Newcomb's Problem in a way that solves it.

Concerning the first argument for conventions, viz., dominance principle, there is a consensus in the literature that Newcomb's Problem is the general case of non-cooperative games, of which the well-known prisoners' dilemma is the prime example [e.g., Lewis in Campbell & Sowden, 1985]. While prisoners' dilemma is a normal form game and Newcomb's Problem is an extensive form game, the dominance principle suggests the same strategy, viz., defection or non-cooperation, which Nozick [1969] identified as one of the possible two solutions. Namely, it is beneficial for the player under focus to cheat in the sense of taking both boxes irrespective of the strategy of the other. In the prisoners' dilemma, consequently, both players cheat, placing them in the worst outcome. Also, in Newcomb's Problem, Being leaves the closed box empty given his prediction that the player will *ex post*, despite any *ex ante* promises, take both boxes.

To elaborate, the agent should cheat, i.e., take both boxes as the case in the prisoners' dilemma, because Being makes his prediction and, accordingly, decides whether to leave \$1 Million in the closed box. The actor comes later in time, which should not make it different from the reasoning of prisoners' dilemma, and makes his move. It would be rational, i.e., would be income maximizing action, to take both boxes because the action will not change what is already in the closed box—irrespective of the Being's good track record in predicting future events. The agent wins extra \$1,000 in either case of whether Being left \$1 Million or left zero in the closed box. The agent who takes both boxes is thinking along the same scientific reasoning of Job's wife: A belief is warranted only if supported by evidence. The evidence does not support the belief that

“Being can mysteriously switch what is in the closed box,” i.e., Being can change its choice as the actor is making his choice. Thus, the dominance principle entails that it would be foolishness if one fails to take both boxes.

Concerning the second reasoning for conventions, viz., backward induction, Jean-Pierre Dupuy [1992, 2000] argues that Newcomb’s Problem is an example of the backward induction principle. If Being thinks that the actor will cheat, and the actor knows what Being thinks, the actor would then definitely cheats. But if the actor believes in the enormous ability of Being to know what he intends, he promises *ex ante* to cooperate and only take the closed box, Being would leave \$1 Million in the empty box. So, there are two possible solutions—depending on the convention adopted concerning the expectations.

Concerning the third reasoning for conventions, viz., expected utility, let us examine Nozick’s [1969] other solution that contradicts the dominance principle, as he recognizes. Following the expected utility principle, the actor behaves as anyone does with regard to superstitions: It is worth gambling and losing \$1,000 in order to gain \$1 Million because one upholds the unwarranted belief in the mysterious ability of Being. Given a slight chance that Being acts in mysterious ways, the agent reasons following expected utility theory: It is worth assuming the supposedly unwarranted belief that “Being can mysteriously switch what is in the closed box.” Even though the belief is not supported by evidence, it is adopted out of blind obedience or for no reason (Zofar). Namely, one should act as if the unwarranted belief is true, i.e., Being can adjust what is in the box in the last second—according to what the actor is actually about to do. So, if Being predicted that the actor will take the open box, but actually the actor does not,

Being might mysteriously put the money in the closed box. Or, if Being predicted that the actor will not take the open box, while actually the actor does, Being might mysteriously take the money out. So, by believing in the supposedly unwarranted belief, one can be assured that Being has perfect prediction. By believing the unwarranted belief, one is expecting \$1 Million against the definite loss of \$1000—which is as miniscule as the cost of responding to a chain letter. Thus, it would be rational, i.e., would be income maximizing action, to take only one box.

So, to maximize income, the theory of rationality cannot tell us what belief to adopt, i.e., upon which rational action depends if one blindly follows the hint that Being can act mysteriously. Consequently, the agent would fall into indecisiveness, undermining the completeness axiom. But such indecisiveness need not be problematic: In the end, we can confront blind obedience that Being has mysterious powers. That is, whatever conflict one has with two conflicting conventions, they can be resolved through the scientific method of testing.

However, if Being expresses faith, faith is off limits to scientific testing and the agent may linger in a state of problematic indecisiveness. On the other hand, while faith cannot be tested scientifically, it is not *a priori* belief that is based on blind obedience. It has to be founded on experience—as the case with Elihu's reasoning. If so, Being can be seen as an externalized faith in one's ability. As such, faith infuses action and action infuses faith. So, the determination of what is in the closed box is determined along how the organism is developing via experience. Thus, by using Elihu's reasoning, which relies on the observation of biological processes, one can be hopeful that through action one can develop his potentiality.

To recapitulate, if Being is seen as an actual entity, whose action is independent of our beliefs, we face the convention problematic I&II based on the two different rationales (backward induction and expected utility). The two rationales generate conventions which contradict what is suggested by the dominance principle. The convention problematic I expresses how we cannot tell the difference between warranted conventions and conventions generated by self-fulfilling prophecies. The convention problematic II expresses how we cannot tell the difference between warranted conventions and superstitions. The conflict among conventions resulting from self-fulfilling prophecy and superstitions can be resolved through further empirical study.

However, if Being is about faith, the concern of the belief paradox, we need a drastic conceptual innovation to resolve the paradox. Namely, to distance faith, i.e., being hopeful through experience, from mere self-fulfilling prophecy (backward induction) or superstitions (expected utility), one needs to conceive faith as belief-as-frame as opposed to belief-as-convention. The belief paradox can be resolved by conceiving the two kinds of beliefs as co-existing rather than as alternatives.

The belief paradox, arising from treating faith as a scientific assertion that is seeking empirical corroboration, can do serious damage. It undermines the completeness axiom, the bedrock of the standard theory of rationality. The axiom rules out indecisiveness arising from conflicting beliefs. Insofar as belief-as-frame and belief-as-convention are confused, there is no ground upon which to resolve conflicting beliefs—whereas as conflict among conventions can be still resolved by further empirical testing. The conflict between frame and conventions would persist if they are seen as alternative.

To wit, the belief paradox, where the agent cannot decide what to believe, would entail widespread paralysis (the Buridan's ass story) [Khalil, 1997a]. However, this is not the case—paralysis is not as pervasive as the belief paradox leaves us to expect. Thus, the puzzle is not limited to the theoretical level: Why is there no extensive paralysis in every-day life—why do humans function more-or-less fairly well despite the prediction of paralysis entailed by the standard theoretical approach of choice?

2.4 Looking Ahead

I attempt to offer a solution to the belief paradox. It hinges on the difference between doubt and hazard—a topic immediately related to the issue of prediction. The doubt/hazard distinction should not be confused with Frank Knight's [1971] famous, but failed uncertainty/risk distinction. Knight as well as Dewey (1960) provide a ground for their distinction. While risk concerns frequent and hence quantifiable events such as the number of homes caught on fire annually in North America, uncertainty concerns unique and hence non-quantifiable events such as a surgeon losing both of his arms.

To note, the issue of uniqueness of events or, to use Dewey's term, the precariousness of human life, is unrelated to the proposed doubt/hazard distinction. I advance an argument related to the biological and psychological developmental processes of living organisms. The argument shows why we should differentiate between two kinds of beliefs, viz., conventions and frames, that living organisms use in the determination of action. Conventions are beliefs related to hazard concerning awareness about the regularities of nature (including human society) such as precipitation, weather fluctuations, and the gyrations of market prices. In contrast, frames are beliefs that are

subject to doubt because they are related to ability the one still needs to demonstrate.

Doubt (or self-doubt, to be more accurate) arises from undertaking a challenging task. To reiterate, in this proposed way of cutting the cake, beliefs that can be self-fulfilling prophecies are conventions, not frames.

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