Changes in Version 2011.01.21

Preface, second paragraph

Changed "guide our actions well" to "guide our actions" in the last sentence.

Preface, tenth paragraph

Changed "In the remaining six chapters, I describe timeless logical frameworks" to "In the remaining chapters, I describe timeless conceptual frameworks" in the last sentence.

Preface, third to last paragraph

Changed "Einstein's twin claims" to "Einstein's claims" in the last sentence.

Preface, second to last paragraph

Changed "the final chapter ," to "the chapter titled" and "rationality" to "reason" in the first sentence.

Preface, last paragraph

Inserted the following paragraph:

"In the final chapter, *Reasoning Well*, I relate boundless pragmatism to twentieth-century analytical philosophy, nineteenth-century German idealism, and fractal geometry. I end with a short summary of the book."

Chapter 1, *The EOQ/RTS Example*, first paragraph

Changed "frame" to "view" in the first and second sentences (2 occurrences).

Chapter 1, Temporal versus Invariant Values, third paragraph

Changed "frame" to "view" in the second and sixth sentences (2 occurrences).

Chapter 3, *Three Approaches to Overcoming Constraints*, second paragraph

"From the frame of mathematics, π is *computable*, which is to say that we can program all of the steps for computing π into a machine that does nothing more than follow logical instructions. In contrast, from the invariant frame of deciding well, π is not computable. The false claim that π is computable arises from reducing the actual problem of computing π to a theoretical problem of computing π."

was changed to:

"From the view of mathematics, π is *computable*, which is to say that we can program a Turing machine, an abstract computing machine that does nothing more than follow programmed rules, to compute π. In contrast, from the invariant view of deciding well, π is not computable. The false claim that π is computable arises from reducing the actual problem of computing π to an abstract problem. As we shall see throughout this work, the tendency of people who excel at abstract reasoning to ignore worldly constraints is common."

Chapter 3, *Three Approaches to Overcoming Constraints*, fourth paragraph, last sentence

"Because this approach relies on endless competition to produce the tools we need to pursue our chosen ends, we may call it *the timeless approach to overcoming constraints*.[4]"

was changed to:

"Over time, people competing for scarce resources will invent ever better means of computing. We we may call this *the timeless approach to overcoming constraints*.[4]"

Chapter 3, *Three Approaches to Overcoming Constraints*, last paragraph

Changed "frame" to "view" in the first sentence.

Chapter 3, *Public Order*, third paragraph

Changed "invariant" to "public" in the last sentence.

Chapter 3, *Public Order*, last paragraph

Changed "invariant" to "public" in the first sentence.

Chapter 3, *Invariant Public Order*, fourth paragraph

Changed "invariant" to "public" in the first sentence.

Chapter 3, *Invariant Public Order*, last paragraph

Changed "invariant approach to constraints" to "public approach to overcoming constraints" in the last sentence.

Chapter 3, *Zero Public Entropy*, fourth paragraph

Changed "invariant approach to constraints" to "public approach to overcoming constraints" in the second sentence.

Chapter 3, *Decision Tree Interpretations of Quantum Mechanics*, fifth paragraph

"From the modern view of physics, the decision tree interpretation of quantum mechanics appears to ignore such things as constraints on deciding well imposed by relativity theory and information theory. In contrast, from the invariant view of decision science, this interpretation hides details about the world as we currently understand it inside the model. This is consistent with the purpose of decision tree models, which is to help us find and solve problems within the domain of the public sciences."

was changed to:

"From the view of modern physics, the decision tree interpretation of quantum mechanics appears to ignore such things as constraints on deciding well imposed by relativity theory and information theory. In contrast, from the invariant view of decision science, this interpretation hides details about the world as we currently understand it inside the decision model. This is consistent with the purpose of these models, which is to help us find and solve problems in the pursuit of the invariant end of deciding well."

Chapter 4, Refining Everyday Thinking, last six paragraphs

"From the modern view of believing well, the relation between the world and the descriptions we use to guide our actions is a problem that makes it harder to understand the world.[3] In contrast, from the invariant view of deciding well, this relation is an opportunity to change the world for the better by using descriptions of the invariant end of deciding well to help us find problems to solve. Every time we choose to act or not to act, we test our beliefs against experience. We bet our welfare on beliefs based upon imperfect knowledge. We learn from the experiences of other people. Other people, in turn, learn from our experiences. *We are both researchers and research subjects in the research program of, by, and for the people*.

"From the modern view of believing well, science concerns what the producers of knowledge are able to supply under current constraints. In contrast, from the invariant view of deciding well, science concerns not only what we are able to supply, but also what we need to decide well.[4] Science is the self-similar, self-referential process of refining everyday thinking.[5] So conceived, science contains its own metascience.[6]

"As we saw in the EOQ/RTS example, temporal views tend to blind us to timeless ends. In the case of believing well, the modern, temporal view tends to blind us to the Truth, and so to the Good, Wisdom, Justice, and Beauty.

"We can see the tendency of the modern view to blind us to timeless ends in the modern way of organizing academic fields into the *humanities*, the *social sciences*, and the *natural sciences*. From the modern view, which concerns what producers are able to supply under current constraints, this scheme makes sense. In contrast, from the invariant view of deciding well, this scheme does not make sense. To carve nature at its joints, we ought to replace these temporal categories with invariant categories. One possibility is to replace them with the *arts*, the *public sciences*, and the *true sciences*. The arts would include all fields that aim at the ring of Truth rather than the Truth itself. Like the humanities, the arts would include what

human beings create. Unlike the humanities, the arts would help us pursue Beauty, and so the Good, the Truth, Wisdom, and Justice.[7]

"The public sciences would include all fields that aim at the Truth about the invariant factors of deciding well other than the Truth. The *moral sciences* would refine our beliefs about living well; the *political sciences* would refine our beliefs about governing ourselves well; and the *decision sciences* would refine our beliefs about deciding well. Unlike the social sciences, the public sciences would embrace the timeless end of revering life well.

"The true sciences would include all fields that aim at the Truth about the Truth. Like the natural sciences, the true sciences would include all fields that seek to refine our beliefs about believing well without concern for the other invariant factors of deciding well. Unlike the natural sciences, the true sciences would not imply that the beliefs and actions of people are not a part of nature."

"[3] Most modern intellectuals prefer 'reflexive' to 'recursive' to describe this complex dynamic. Arguably, this is because they see their role as helping people believe well rather than helping them decide well. We see this in the distinction between Thomas Kuhn's concept of a paradigm shift as a change in the way we conceive of the world and the popular concept of a paradigm shift as a change in the way we see the world that changes the world for the better. Kuhn cared about believing well per se. In contrast, the people who shifted Kuhn's paradigm cared about believing well in order to decide well. They took a longer view."

"[4] In modern economic terms, the argument for a holistic approach to believing well put forth in this work concerns the demand as well as the supply side of believing well. Readers looking for supply-side arguments for a holistic approach to believing would do well to start with W. V. O. Quine's "Two Dogmas of Empiricism.""

"[5] The essential process of refining everyday thinking is self-similar in that it is the same regardless of what size problem we choose. It is self-referential in that it refers to itself. We may think of the essential process of refining everyday thinking as the essential process of ridding ourselves of ever more ignorance about the world. At the smallest problem scale that we can imagine, which currently is the problem scale of quantum mechanics, our ignorance takes the form of uncertain predictions. At the largest problem scale we can imagine, which is the problem that contains all other problems, our ignorance takes the form of incomplete descriptions of what we need to do in order to rid ourselves of ever more ignorance of the world. Between these two extremes, our ignorance takes the form of both uncertain predictions and incomplete descriptions of what we need to do in order to rid ourselves of ever more ignorance. In seeking to rid ourselves of ever more ignorance, we need to address both of these types of ignorance."

"[6] Arguably, this process consists of two levels of frames. There are basic frames that we use to choose solutions to temporal problems. These frames are analogous to the scientific frames of modern science. There are also invariant frames that we use to choose temporal problems, timeless problems, and the means for choosing timeless problems. These frames are

analogous to the metaphysical frames of modern science. However, these frames are subject to empirical testing. Hence, we may reasonably call them *metascientific frames*. Philosophers may find in this boundless approach to believing well parallels to W. V. O. Quine's naturalistic epistemology. A major difference is that the former embraces the whole of experience and the latter only embraces those aspects of experience that directly concern believing well. From the invariant view of deciding well, the incompleteness of Quine's epistemology gave rise to both Jaegwon Kim's criticism of Quine's epistemology for not having a normative element and Morton White's argument with Quine over the scope of holistic pragmatism. The philosophy of science is philosophy enough if and only if science includes the interwoven pursuits of all invariant factors of deciding well."

"[7] The arts ought to do more than shock us or speak to us. The arts ought to enlighten us. This is not to say that history is nothing more than literature. History is literature constrained by the methods and fashions of historians."

were changed to:

"From the modern view of believing well, the relation between the world and the descriptions we use to guide our actions is a problem that makes it harder to understand the world. In contrast, from the invariant view of deciding well, this relation is an opportunity to change the world for the better.[3]

"***Metascience***
From the modern view of believing well, science concerns what the producers of knowledge are able to supply under current constraints. In contrast, from the invariant view of deciding well, science concerns not only what we are able to supply under current constraints, but also what we need to decide well.[4]

"The essential process of deciding well consists of two levels of models. There are models that we use to choose solutions to temporal problems. There are also models that we use to choose temporal problems, timeless problems, and the means for choosing timeless problems. We may call these *metascientific models*.[5]

"Metascientific models are part of science. We not only test these models through experience, but also base them on experience:

> "Consider the process of pursuing some timeless end. Within the frame of pursuing this end, we define the timeless and transcendental ends tautologically. The timeless end is what we pursue when we pursue the transcendental end, and the transcendental end is what we pursue when we pursue the timeless end. This tautology tells us nothing about either the timeless or transcendental end.
>
> "Now consider the proposition that it is only from experience that we learn. From within the frame of pursuing some timeless end, it is only from the experience of overcoming the constraints that hinder us in pursing the timeless

end that we learn more of the timeless end. For example, from within the frame of pursuing the timeless end of living well, it is only from the experience of overcoming some hunger that we learn of the greater good that results from overcoming this hunger. Similarly, from within the frame of pursuing the timeless end of believing well, it is only from the experience of overcoming some ignorance that we learn of the greater truth that results from overcoming this ignorance.

"Next consider how this applies to pursuing the timeless end of deciding well. From within the frame of pursuing the timeless end of deciding well, it is only from experience in overcoming some foolishness that we learn of the greater wisdom that results from overcoming this foolishness. However, when this foolishness is what hinders us from seeing the relations between the invariant factors of deciding well, we learn that we can learn something of one invariant factor of deciding well by overcoming the constraints that hinder us from pursuing another invariant factor of deciding well. For example, overcoming a constraint that hinders us from pursuing the timeless end of living well, say the need for acceptance by what we currently believe to be members of our society, can help us learn more about the timeless end of believing well.

"From within the frame of pursuing the timeless end of believing well, learning something from other than the experience of overcoming a constraint that *directly* hinders us from believing well may appear to be learning something from other than experience. From the invariant view of deciding well, the cause of this false appearance lies in failing to recognize that pursuing the timeless end of believing well calls for us to pursue the timeless end of deciding well. Anything that hinders us from pursuing the timeless end of deciding well also hinders us from pursuing the timeless end of believing well.[5]

"*Invariant science contains its own metascience*.[6]

"***Two Types of Ignorance***

We may think of science as the process of ridding ourselves of ever more ignorance about the world. This ignorance takes the form of uncertain predictions and incomplete descriptions of what we need to do in order to rid ourselves of ever more ignorance. In seeking to rid ourselves of ever more ignorance, we need to address both of these types of ignorance. We do so by testing the models that we use to predict by how well these models help us predict and by testing the models that we use to explain causation by how well these models help us find problems to solve in pursuing the invariant end of deciding well.

"There exist extremes in which the invariant method of testing models does not work. At the smallest possible problem-scale level, we have no need to find problems to solve on a smaller problem-scale level, hence no need to explain causation. All of our ignorance on this level is in the form of uncertain predictions. For example, if the problem-scale level of quantum mechanics is the smallest possible problem-scale level, we have no need to find problems to

solve on a smaller problem-scale level, hence no need to explain causation on the level of quantum mechanics. On the other hand, if the problem-scale level of quantum mechanics is not the smallest possible problem-scale level, we have a need to find problems to solve on a smaller level, hence the need to explain causation on the level of quantum mechanics. From a hidden-variables view of quantum mechanics, we ought to search smaller problem-scale levels for models that explain causation on the level of quantum mechanics. From a decision-oriented view of quantum mechanics, we ought to search smaller problem-scale levels for models that both explain causation on the level of quantum mechanics *and best help us pursue the invariant end of deciding well*.

"At the largest problem-scale level, which we may call *the transcendent level*, there is nothing left to learn, hence no need for either models that help us predict or models that help us explain. About this level, of which we can speak only in terms that we define tautologically, we can say nothing that is useful to the pursuit of the invariant end of deciding well.

"***Academic Fields***
From the invariant view of deciding well, we best pursue the timeless end of believing well by pursuing the invariant end of deciding well. This prescription for believing well will likely seem as strange to modern academics today as the Toyota system seemed to Western production managers in the early eighties. As we saw in the EOQ/RTS example, temporal views tend to blind us to timeless ends. In the case of believing well, modern views tend to blind us to the need to pursue the invariant factors of deciding well.

"We can see the tendency of modern views to blind us to the need to pursue the invariant factors of deciding well in the modern way of organizing academic fields into the *humanities*, the *natural sciences*, and the *social sciences*. From the modern view, which concerns what producers are able to supply under current constraints, this scheme makes sense. In contrast, from the invariant view of deciding well, it does not make sense. To carve nature at its joints, we ought to replace these temporal categories with categories based on the invariant factors of deciding well. One possibility is to replace them with the *arts*, the *true sciences*, and the *public sciences*.

"The arts would include all fields that aim directly at pursuing the timeless end of contemplating well. Like the humanities, the arts would include what human beings create. Unlike the humanities, the arts would help us pursue the timeless end of contemplating well, and through this pursuit all of the other invariant factors of deciding well.[7]

"The true sciences would include all fields that aim directly at the timeless end of believing well. Like the natural sciences, the true sciences would include all fields that seek to refine our beliefs about believing well. Unlike the natural sciences, the true sciences would not imply that the beliefs and actions of people are not a part of nature.

"The public sciences would include all fields that aim directly at the remaining invariant factors of deciding well. The *moral sciences* would include all fields that aim directly at the timeless end of living well; the *political sciences* include all fields that aim directly at the

timeless end of cooperating well / governing ourselves well; and the *decision sciences* include all fields that aim directly at the timeless end of deciding well. Unlike the social sciences, the public sciences would embrace the timeless end of revering life well."

"[3] Most modern intellectuals prefer 'reflexive' to 'recursive' to describe this complex dynamic. Arguably, this is because they see their role as helping people believe well rather than helping them decide well. We see this in the distinction between Thomas Kuhn's concept of a paradigm shift as a change in the way we conceive of the world and the popular concept of a paradigm shift as a change in the way we see the world that changes the world for the better. Kuhn cared about believing well per se. In contrast, the people who shifted Kuhn's paradigm cared about believing well in order to decide well. They took a longer view."

"[4] In modern economic terms, the argument for a holistic approach to believing well put forth in this work concerns the demand as well as the supply side of believing well. Readers looking for supply-side arguments for a holistic approach to believing would do well to start with W. V. O. Quine's "Two Dogmas of Empiricism.""

"[5] Philosophers of science may find in this boundless approach to believing well parallels to W. V. O. Quine's naturalistic epistemology. A major difference is that the boundless approach embraces the whole of experience. From the invariant view of deciding well, the incompleteness of Quine's epistemology gave rise to both Jaegwon Kim's criticism of Quine's epistemology for not having a normative element and Morton White's argument with Quine over the scope of holistic pragmatism. The philosophy of science is philosophy enough if and only if science includes the interwoven pursuits of all invariant factors of deciding well."

"[6] In philosophy of science terms, metascience models are *a posteriori* rather than *a priori*. They only appear to be *a priori* to people who take too narrow a view of science."

"[7] The arts ought to do more than shock us or speak to us. The arts ought to enlighten us. This is not to say that history is nothing more than literature. History is literature constrained by the methods and fashions of historians."

Chapter 4, *A Crude Look at the Whole*, first paragraph, first footnote, fifth sentence

Inserted the following sentence:

"This is consistent with the self-similar nature of the process that creates these networks, with the power law distribution of income, and with the fractal distribution of commodity price changes over time."

Chapter 5, Liberalism, first paragraph

Changed "invariant approach to governing" to "public approach to governing" in the last sentence.

Chapter 8, Summary and Conclusion, title

Changed title to "Reasoning Well."

Added the following quote:

""Philosophy, as I shall understand the word, is something intermediate between theology and science. Like theology, it consists of speculations on matters as to which definite knowledge has, so far, been unascertainable; but like science, it appeals to human reason rather than to authority, whether that of tradition or that of revelation. All *definite* knowledge — so I should contend — belongs to science; all *dogma* as to what surpasses definite knowledge belongs to theology. But between theology and science there is a No Man's Land, exposed to attack from both sides; this No Man's Land is philosophy." — *Bertrand Russell*[1]"

"[1] Russell, Bertrand, *A History of Western Philosophy* (New York: Simon and Schuster, 1967), p. xiii."

Chapter 8, Reasoning Well, last paragraph

Added the following:

"[This is the stub of a chapter that relates boundless pragmatism to twentieth-century analytical philosophy, nineteenth-century German idealism, and fractal geometry.]"

Changes in Version 2011.02.05

Preface, ninth paragraph

Changed "concept" to "view" in the first sentence.

Preface, twelfth paragraph

Changed "the pursuit of the timeless end of deciding well" to "pursuing the timeless end of deciding well" in the first sentence.

Chapter 1, Temporal versus Timeless Values, second paragraph

Changed "governing ourselves well" to "working together well" in the second to last sentence.

Chapter 1, Temporal versus Timeless Values, third paragraph

Changed "timeless end of believing well" to "timeless end of believing well (the Truth)" in the last sentence.

Chapter 1, Temporal versus Timeless Values, fourth paragraph

Changed "timeless end of believing well" to "the Truth" in the first sentence.

Chapter 1, Temporal versus Timeless Values, seventh through last paragraphs

"From a temporal frame, the usefulness of concepts raises sociological questions about how people collectively choose concepts. These questions include who chooses, why they choose as they do, and why other people accept what they choose. In contrast, from a timeless frame, the usefulness of concepts raises the question of what system of concepts best helps us pursue the timeless end well. Addressing this question calls for us to consider the ultimate end of believing well. Is it a means of pursuing the Good? Is it a means of pursuing the Truth, which is to say an end in itself? Is it a means of pursuing Justice? Is it all of these things? Is it all of these things and more?

"From the timeless frame put forth in this work, the timeless end of believing well emerges from the endless pursuit of deciding well. By deciding well, we learn to decide ever more wisely, which includes learning ever more about believing well.

"Over time, we learn that there exist universal factors of deciding well that we can never have in excess. These universal, boundless factors include the timeless ends of living well (the Good) and believing well (the Truth). We need the Good to avoid deprivation, which hinders us from deciding well. We need the Truth to avoid ignorance, which also hinders us from deciding well.

"Over time, we learn that the endless pursuits of all universal, boundless factors of deciding well intertwine to form a single endless pursuit. Consider the relation between the pursuit of the Good and the pursuit of the Truth. We pursue the Good by deciding well, which calls for us to pursue the Truth. We pursue the Truth by deciding well, which calls for us to pursue the Good. Thus the pursuit of the Good and the pursuit of the Truth intertwine to form a single pursuit, which we may call the pursuit of Wisdom. The better we decide, the tighter we intertwine the pursuits of the Good and the Truth into the pursuit of Wisdom. By similar reasoning, all pursuits of universal, boundless factors of deciding well intertwine to form the pursuit of Wisdom. The better we decide, the tighter we intertwine the pursuits of these factors of deciding well into the pursuit of Wisdom.

"Over time, we learn that the timeless end of governing ourselves well (Justice) is a matter of cooperating well in the pursuit of the timeless end of deciding well. We need the help of others to pursue the timeless end of deciding well. We can never cooperate too well with other people, including people separated from us by great distances or long periods of time. Hence, the timeless end of governing ourselves well, which is also the timeless end of cooperating well, is a universal, boundless factor of deciding well.

"The ancient Chinese provide us with a simple model for cooperating over great distances and long periods: "The debts that we owe to our ancestors we pay to our descendants." Extending this model to all people, we can cooperate well across great distances and long

periods with the universal moral rule: "The debts we cannot pay to whom they are due we pay to others by deciding well." This includes the debts that we owe to those who provided us with the knowledge that we use freely. Following this rule, we ought to pursue the timeless end of deciding well regardless of our current beliefs and circumstances. When we expand the problems we face to the limits of imagination, our problems become part of the problem that contains all other problems. The solution to this universal problem, which is pursuing the timeless end of deciding well, is the same for all of us. In the language of mathematics, the pursuit of the timeless end of deciding well is invariant with respect to reference frames based on beliefs and circumstances. Further, the universal, boundless factors of deciding well are invariant with respect to reference frames based on beliefs and circumstances.

"Consider how we can use the invariant frame of deciding well to help us choose the best frame for judging how well we govern ourselves. From within each frame we consider, the frame we are in looks to be the best frame. We find ourselves in a mental hall of mirrors from which analytical techniques cannot help us escape. Twentieth-century philosopher John Rawls provides us with a timeless technique that can help us reason our way out of this quandary. He asks us to imagine what we should choose if we were ignorant of the circumstances of our birth.[13] For this imagined original position of ignorance to produce a *completely just* end, we must consider to what end we should want to guide people if we were *completely ignorant* of the circumstances of our birth, which includes ignorance of what species we will be and into what era we will be born. From behind this veil of complete ignorance, we should want all people to pursue the timeless end of revering life well.[14] We pursue this timeless end by deciding well.

"Over time, we learn that the more our beliefs about pursuing the invariant end of deciding well fit together into a coherent whole and the better the problem we are considering fits this coherent whole, the more likely the problem we are considering is a good problem to solve. We may call the endless process of thinking deeply about how our beliefs about pursuing the invariant end of deciding well fit together into a coherent whole and of thinking deeply about how the problems we are considering fit this coherent whole the endless process of contemplating well. So conceived, the timeless end of contemplating well is an invariant factor of deciding well. We may call this timeless end *Beauty*.

"In summary, values are intellectual tools for helping us choose problems to solve. From a temporal frame of deciding well, people base their values on what they currently know. The source of this knowledge lies beyond the temporal process of deciding well. In contrast, from the invariant frame of deciding well, our values emerge from the invariant process of deciding well. Over time, we learn that we ought to pursue the invariant end of deciding well, hence the invariant factors deciding well. These factors include the timeless ends of living well, believing well, governing ourselves well, and contemplating well."

were changed to:

"From a temporal view, the usefulness of concepts raises sociological questions about how people collectively choose concepts. These questions include who chooses, why they choose

as they do, and why other people accept what they choose. In contrast, a timeless view, the usefulness of concepts raises the question of what system of concepts best helps us pursue the timeless end we pursue. Addressing this question calls for us to choose a frame, which in turn calls for us to choose a frame, which in turn calls for us to choose a frame, and so on to infinity. We best address this infinitely large problem by pursuing the timeless end of deciding well (Wisdom), which is the original problem we set out to address.

"From a logical view, exploring the relation between pursuing Wisdom and pursuing the Truth led us back to our original problem pursuing Wisdom, and so was fruitless. However, from the boundlessly pragmatic view put forth in this work, we have learned that pursuing Wisdom well calls for us to pursue the Truth well. In terms of learning-by-doing, we have learned that learning to pursue Wisdom ever better calls for us to learn to pursue the Truth ever better.

"***A Pragmatic Model of Pursuing Wisdom***
We can use this insight as the basis for a model of pursuing Wisdom. Building this model calls for repeating three basic steps. The first is discovering a member of the set of factors of pursuing Wisdom that we can never have in excess. The second is building a simple frame for pursuing each of this boundless factor by defining it and the means to it in terms of one another. The third is recognizing that Wisdom is a boundless factor of this boundless factor of pursuing Wisdom.

"The simplest model we can build using these three steps is the model in which the only member of the set of boundless factors of pursuing Wisdom is Wisdom. We build the frame for this simple model by defining Wisdom to be the timeless end of deciding well and by defining deciding well to be the means to Wisdom. We complete this simple model by recognizing that Wisdom is a boundless factor of pursuing Wisdom. This single-frame model follows the rules of logic for relating beliefs within frames. However, it is useless as a tool for helping us find problems to solve in pursuing Wisdom.

"To make this model useful in finding problems to solve in pursuing Wisdom, we need to add more frames to it. We can begin by adding a frame for pursuing the Truth. We do so by defining the Truth to be the timeless end of believing well and by defining believing well to be the means to the Truth. We then recognize that Wisdom is a boundless factor of pursuing the Truth.

"The addition of a second boundless factor of pursuing Wisdom allows us to explore the relations between the pursuits of the boundless factors of pursuing Wisdom. Pursuing Wisdom calls for us to pursue the Truth and pursuing the Truth calls for us to pursue Wisdom. Hence, the pursuits of Wisdom and the Truth intertwine to form a single pursuit. The better we pursue Wisdom and pursue the Truth, the more tightly the pursuits of Wisdom and the Truth intertwine. If we pursued both of these timeless ends perfectly, the pursuit of the Truth and the pursuit of Wisdom would be the same pursuit. Because we do not pursue these timeless ends perfectly, it useful for us to think of them as separate pursuits, each subject to its own set of problems.

"This two-frame model helps us find problems to solve in pursuing Wisdom by telling us we need to weed out all problems that are not consistent with pursuing the Truth. However, this usefulness comes at the cost of consistency with the rules that we use to judge relations between beliefs within a frame. For example, from within the frame of pursuing Wisdom within this two-frame model of pursuing Wisdom, we pursue Wisdom; from within the frame of pursuing the Truth within this two-frame model of pursuing Wisdom, we pursue the Truth; and from within this two-frame model of pursuing Wisdom as a whole, we pursue both Wisdom and the Truth. The statement that we pursue the Truth is true from within the frame of pursuing the Truth and from within the model as a whole, but not from within the frame of pursuing Wisdom. Similarly, the statement that we pursue Wisdom is true from within the frame of pursuing Wisdom and from within the model as a whole, but not from within the frame of pursuing the Truth. *In general, any model of pursuing a timeless end that calls for learning by doing can never be both useful in pursuing the timeless end and completely consistent with the rules that we use to judge the relations between beliefs within a frame*.

"***More Complete Models of Pursuing Wisdom***
We naturally seek to survive and flourish, to live and to live well. In terms of modern biology, the timeless end of living well is a *teleonomic end*, an end determined by our biological programming. As such it is something that is independent of our beliefs and circumstances. In mathematical terms, it is *invariant* with respect to beliefs and circumstances.

"Adding the frame of pursuing the timeless end of living well (the Good) provides us with another means of judging problems to solve. We do so by defining the Good to be the timeless end of living well and living well to be the means to the Good. We then recognize that Wisdom is a boundless factor of the Good.

"Pursuing the boundless factors of pursuing Wisdom calls for us to fit our beliefs together into a coherent whole based on the symmetry of pursuing Wisdom well. We may call the process of thinking deeply about how our beliefs fit together into a coherent whole based on the symmetry of pursuing Wisdom *contemplating well* and the timeless end of contemplating well *Beauty*. So conceived, Beauty is a boundless factor of pursuing Wisdom.

"Pursuing the boundless factors of pursuing Wisdom also calls for us to work well with others, including people separated from us by great distances and long periods. We may call the timeless end of working together well, which is also the timeless end of cooperating well and the timeless end of governing ourselves well, *Justice*. Adding the frame of pursuing Justice to our multiple-frame model of pursuing Wisdom provides us with another way to judge problems to solve in pursuing Wisdom.

"The ancient Chinese provide us with a simple model for working together over great distances and long periods: "The debts that we owe to our ancestors we pay to our descendants." Extending this model to all people, we can work together well across great distances and long periods in pursuing Wisdom with the universal moral rule: "The debts we cannot pay to whom they are due we pay to others by pursuing Wisdom." This includes the debts that we owe to those who provided us with the knowledge that we use freely.

"Consider how we can use this rule for working together well to help us choose the best frame for judging how well we govern ourselves. From within each frame we consider, the frame we are in looks to be the best frame. We find ourselves in a mental hall of mirrors from which analytical techniques cannot help us escape. Twentieth-century philosopher John Rawls provides us with a timeless technique that can help us reason our way out of this quandary. He asks us to imagine what we should choose if we were ignorant of the circumstances of our birth.[13] For this imagined original position of ignorance to produce a *completely just* end, we must consider to what end we should want to guide people if we were *completely ignorant* of the circumstances of our birth, which includes ignorance of what species we will be and into what era we will be born. From behind this veil of complete ignorance, we should want all people to pursue the timeless end of revering life well, which we may call *Wholeness*.[14] Adding the frame of pursuing Wholeness to our multiple-frame model of pursuing Wisdom gives us another way to judge problems to solve in pursuing Wisdom.

"***Primary Factors of Deciding Well***
Pursing Wisdom calls for us to refine our beliefs about pursuing Wisdom. When we are completely ignorant about the world, including ourselves, it is as reasonable for us to be completely open-minded about what values we ought to use to guide our decisions. As we learn ever more about the world, it is reasonable for us to become ever more discriminating about what values we use to guide our decisions. When we learn how foolish it is to ignore what we may learn by doing, it is reasonable for us to weed out values based on temporal ends. When we learn how pursuing any timeless end well calls for us to pursue Wisdom, which in turn calls for us to pursue all of the boundless factors of pursuing Wisdom, it is reasonable for us to weed out values that are not boundless factors of pursuing Wisdom.

"Some boundless factors of pursuing Wisdom are subordinate to others. For example, the timeless end of competing well (Winning) is subordinate to the timeless end of working together well (Justice). Competing well is a means of discovering which belief or set of beliefs best helps us pursue Wisdom. Working together well includes working together to discover which beliefs best help us pursue Wisdom. Similarly, the timeless end of contemplating well (Beauty) and the timeless end of reasoning well (Reason) are subordinate to the timeless end of believing well (the Truth). Contemplating well and reasoning well are parts of refining our beliefs about pursuing Wisdom.

"We can imagine a set of boundless factors of pursuing Wisdom that are subordinate only to Wisdom. We may call these *primary factors of pursuing Wisdom*. By definition, Wisdom is a member of this set. Other members of this set include the Good, the Truth, and Justice. To include Wholeness in this set is to claim that Wholeness is not subordinate to the Good. This belief currently is, and will likely forever remain, a matter of faith, a matter of belief beyond reason."

Chapter 2, entire chapter

Changed "invariant frame" to "invariant view" in all (7 occurrences).

Changed "invariant view of deciding well" to "view of the multiple-frame model of pursuing Wisdom" in all (9 occurrences).

Chapter 2, A Strategy for Living Well, last paragraph

Changed "the invariant end of deciding Well" to "Wisdom" in the last sentence.

Chapter 3, entire chapter

Changed "invariant view of deciding well" to "view of the multiple-frame model of pursuing Wisdom" in all (5 occurrences).

Changed "the invariant end of deciding well" to "Wisdom" in all (8 occurrences).

Changed "invariant factors of deciding well" to "boundless factors of pursuing Wisdom" in all (3 occurrences).

Chapter 3, Pursuing the Ring of Truth, second paragraph

Changed "governing ourselves well" to "working together well" in the fourth sentence.

Chapter 3, Pursuing the Ring of Truth, third paragraph

Changed "the temporal view" to "a temporal view" in the first sentence.

Chapter 3, Pursuing the Ring of Truth, last paragraph

Changed "the invariant factors of deciding well" to "the boundless factors of pursuing Wisdom" in the first and fourth sentences (2 occurrences).

Changed "timeless end of believing well" to "Truth" in the first sentence.

Chapter 3, *Decision-Oriented Interpretations of Quantum Mechanics*, fifth paragraph

Changed "the pursuit of the Wisdom" to "pursuing Wisdom" in the last sentence.

Chapter 3, The Elephant in the Room, first paragraph

Changed "the Wisdom" to "Wisdom" in the first sentence.

Chapter 4, entire chapter

Changed "invariant factors of deciding well" to "boundless factors of pursuing Wisdom" in all (6 occurrences).

Changed "invariant view of deciding well" to "view of the multiple-frame model of pursuing Wisdom" in all (8 occurrences).

Changed "pursuing the invariant end of deciding well" to "pursuing Wisdom" in all (4 occurrences).

Changed "the timeless end of living well" to "the Good" in all (3 occurrences).

Changed "the timeless end of believing well" to "the Truth" in all (9 occurrences).

Changed "the timeless end of deciding well" to "Wisdom" in all (5 occurrences).

Chapter 4, Refining Everyday Thinking, last paragraph, footnote

Changed "decide well" to "to pursue Wisdom" in the third sentence.

Chapter 4, *Two Types of Ignorance*, last paragraph

Changed "the pursuit of the invariant end of deciding well" to "pursuing Wisdom" in the last sentence.

Chapter 4, *Academic Fields*, third paragraph

Changed "the timeless end of contemplating well" to "Beauty" in all (2 occurrences).

Chapter 4, *Academic Fields*, last paragraph

Changed "the timeless end of cooperating well / governing ourselves" to "Justice" in the second sentence.

Changed "the timeless end of revering life well" to "Wholeness" in the last sentence.

Chapter 4, Refining Deciding Well, first paragraph, footnote

Changed "timeless end of living well (the Good)" to "the Good" in the second to last sentence.

Chapter 5, entire chapter

Changed "invariant view of deciding well" to "view of the multiple-frame model of pursuing Wisdom" in all (7 occurrences).

Changed "pursuing the invariant end of deciding well" to "pursuing Wisdom" in all (2 occurrences).

Chapter 5, Sovereignty, first paragraph

Changed "governing ourselves well" to "working together well, which we may also call governing ourselves well," in the first sentence.

Chapter 5, Sovereignty, third paragraph, footnote

Changed "deciding well" to "pursuing Wisdom" in the fourth sentence.

Changed "fall" to "fail" in the last sentence.

Chapter 5, Liberalism, second paragraph

Changed "the timeless end of governing ourselves well (Justice)" to "Justice" in the third sentence.

Chapter 6, entire chapter

Changed "invariant view of deciding well" to "view of the multiple-frame model of pursuing Wisdom" in all (2 occurrences).

Changed "the invariant end of deciding well" to "Wisdom" in all (5 occurrences).

Chapter 6, A Common Timeless End, first paragraph

"Materialists and dualists can find a common timeless end in the publicly proclaimed and practiced timeless end of revering life well. We need to pursue this timeless end of revering life well in order to pursue Wisdom. Further, we pursue the timeless end of revering life well by deciding well. Hence, this timeless end of revering life well is an invariant factor of deciding well. The timeless pursuit of revering life well intertwines with the timeless pursuits of all of the invariant factors of deciding well . We may call this common timeless end *Wholeness*. Pursuing Wholeness is part of pursuing the Good, the Truth, Wisdom, Justice, and Beauty; and pursuing the Good, the Truth, Wisdom, Justice, and Beauty are parts of pursuing Wholeness."

was changed to:

"Materialists and dualists can find a common timeless end in the timeless end of revering life well, which we may call *Wholeness*. From both views, Wholeness is a boundless factor of pursuing Wisdom. Pursuing Wisdom calls for us to pursue Wholeness. In turn, pursuing Wholeness calls for us to pursue Wisdom. From a materialist view, Wholeness is subordinate to the Good. From a dualist view, Wholeness is a primary factor of pursuing Wisdom."

Chapter 7, entire chapter

Changed "invariant view of deciding well" to "view of the multiple-frame model of pursuing Wisdom" in all (7 occurrences).

Changed "the invariant end of deciding well" to "Wisdom" in all (6 occurrences).

Chapter 7, second paragraph

"We pursue the timeless end of competing well by pursuing the timeless end of deciding well. We also pursue the timeless end of deciding well by pursuing the timeless end of competing well. Hence, the timeless end of competing well is an invariant factor of deciding well. Pursuing the timeless end of competing well intertwines with pursuing the timeless ends of living well, believing well, contemplating well, working together well, deciding well, and revering life well. The better we decide, the more tightly these endless pursuits intertwine."

was deleted.

Chapter 7, new second paragraph, last sentence

"The surest means of achieving this temporal end is for all people to *knowingly* pursue Wisdom."

was changed to:

"The surest means of achieving this end is to pursue Wisdom deliberately."

Chapter 7, Temporal OODA Loop Analysis, first paragraph

Changed "pursue the timeless end of competing well" to "compete well" in the last sentence.

Chapter 7, *Boyd's Grand Strategy*, second paragraph, first sentence

"Boyd did not provide us with a clear and concise definition of a grand strategy that rings true with pursuing the timeless ends of deciding well (Wisdom), living well (the Good), contemplating well (Beauty), believing well (the Truth), cooperating well (Justice), and revering life well (Wholeness)."

was changed to:

"Boyd did not provide us with a clear and concise definition of a grand strategy that rings true with pursuing the boundless factors of pursuing Wisdom."

Chapter 7, *The Grandest Possible Strategy*, last two paragraphs

"The grandest possible strategy is the strategy of pursuing the timeless ends of deciding well, living well, contemplating well, believing well, cooperating well, and revering life well. We may call this *the invariant strategy*.

"Adopting the invariant strategy calls for making the national goal identical to the grand strategy. From the theistic view of Abraham Lincoln, nations ought not to be concerned about whether God is on their side; but rather about being on the right side, for God is always right. Might may pretend to be right; but right makes might."

were changed to:

"The grandest possible strategy is the strategy of pursuing Wisdom. Adopting this strategy calls for making the national goal pursuing Wisdom. From the theistic view of Abraham Lincoln, nations ought not to be concerned about whether God is on their side; but rather about being on the right side, for God is always right. Might may pretend to be right; but right makes might."

Appendix A, Producing Ever More Leanly, first paragraph

Changed "invariant view of deciding well" to "view of the multiple-frame model of pursuing Wisdom" in the first sentence.

Changes in Version 2011.02.12

Chapter 1, *More Complete Models of Pursuing Wisdom*, third paragraph, last sentence

Added the footnote:

"[13] Philosophers of science may find in this boundless approach to believing well parallels to W. V. O. Quine's naturalistic epistemology (theory of knowledge). A major difference is that the boundless approach embraces the whole of experience. From the invariant view of deciding well, the incompleteness of Quine's epistemology gave rise to both Jaegwon Kim's criticism of Quine's epistemology for not having a normative element (pursuing the Good) and Morton White's argument with Quine over the scope of holistic pragmatism (pursuing all of the boundless factors of deciding well). *The philosophy of science is philosophy enough if and only if science includes the interwoven pursuits of all boundless factors of pursuing Wisdom*."

Chapter 2, Invariant Tools for Living Well, first paragraph

Changed "frame" to "view" in the first sentence.

Chapter 2, Profit, last paragraph

Changed "deciding well" to "pursuing Wisdom" in the last sentence.

Chapter 2, Profit, last paragraph

Changed "deciding well" to "pursuing Wisdom" in the last sentence.

Chapter 4, *Metascientific Models*, second paragraph

"The essential process of deciding well consists of two levels of models. There are models that we use to choose solutions to temporal problems. There are also models that we use to choose temporal problems, timeless problems, and the means for choosing timeless problems. We may call these *metascientific models*."

was changed to:

"The essential process of deciding well consists of models that we use to choose solutions to temporal problems and models that we use to choose temporal problems, timeless problems, and the means for choosing timeless problems. We may call the models we use to choose problems *metascientific models*."

Chapter 4, *Metascientific Models*, third paragraph, first blocked paragraph

"Consider the process of pursuing some timeless end. Within the frame of pursuing this end, we define the timeless and transcendental ends tautologically. The timeless end is what we pursue when we pursue the transcendental end, and the transcendental end is what we pursue when we pursue the timeless end. This tautology tells us nothing about either the timeless or transcendental end."

was changed to:

"Consider the process of pursuing a timeless end. Within the frame of pursuing this end, we define the timeless end and the means of pursuing this timeless end tautologically. This tautology tells us nothing about either the timeless end or the means to it."

Chapter 4, *Metascientific Models*, third paragraph, second blocked paragraph

Changed "some" to "a" in the second sentence.

Chapter 4, *Metascientific Models*, third paragraph, last blocked paragraph

Changed "believing well" to "pursuing the Truth" in the second sentence.

Deleted the footnote:

"[5] Philosophers of science may find in this boundless approach to believing well parallels to W. V. O. Quine's naturalistic epistemology. A major difference is that the boundless approach embraces the whole of experience. From the invariant view of deciding well, the incompleteness of Quine's epistemology gave rise to both Jaegwon Kim's criticism of Quine's epistemology for not having a normative element and Morton White's argument with Quine over the scope of holistic pragmatism. The philosophy of science is philosophy

enough if and only if science includes the interwoven pursuits of all boundless factors of pursuing Wisdom."

Chapter 4, *Metascientific Models*, third paragraph, last sentence, footnote

"[6] In philosophy of science terms, metascience models are *a posteriori* rather than *a priori*. They only appear to be *a priori* to people who take too narrow a view of science."

was deleted.

Chapter 4, Refining Deciding Well, third paragraph

Changed "decide well" to "pursue Wisdom" in the first two sentences.

Chapter 4, Refining Deciding Well, last paragraph

Changed "deciding well" to "pursuing Wisdom" in the first sentence.

Changed "how to decide well" to "how best to pursue Wisdom" in the last sentence.

Chapter 4, *Learning from Experience*, first paragraph

Changed "decide well" to "pursue Wisdom" in the first sentence.

Chapter 4, *A Crude Look at the Whole*, first paragraph

Changed "deciding well" to "pursuing Wisdom" in the second and eighth sentences (2 occurrences).

Chapter 4, *A Crude Look at the Whole*, last paragraph

Changed "deciding well" to "pursuing Wisdom" in the last sentence.

Chapter 4, Useful Reminders, first paragraph

"We pursue the Truth by deciding well. Deciding well calls for us to judge not only footholds and handholds but also paths leading to the Good, the Truth, Wisdom, Justice, and Beauty. In theory, it also calls for us to consider these timeless ends in even our smallest decisions — to see the world in a grain of sand."

was changed to:

"We pursue the Truth by pursuing Wisdom. Pursuing Wisdom calls for us to judge not only footholds and handholds but also paths leading to Wisdom, hence to all of the boundless factors of pursuing Wisdom. In theory, it also calls for us to consider these timeless ends in even our smallest decisions — to see the world in a grain of sand."

Chapter 5, *A Sovereign Story of Deciding Well*, title

Changed title to "*A Sovereign Story for Pursuing Wisdom*."

Chapter 5, *A Sovereign Story for Pursuing Wisdom*, first paragraph

Changed "deciding well" to "pursuing Wisdom" in the last sentence.

Chapter 5, *A Sovereign Story for Pursuing Wisdom*, second paragraph, blocked paragraph

"We hold these beliefs to be true beyond all doubt. All people have the sovereign right to decide ever more wisely. To secure this right, individuals form governments that derive their powers from the consent of the governed. Whenever a government hinders deciding ever more wisely, it is the right of the governed to alter or to abolish it, and to form a new government based on what they believe most likely to help them decide ever more wisely."

was changed to:

"We hold these beliefs to be true beyond all doubt. All people have the sovereign right to pursue Wisdom. To secure this right, individuals form governments that derive their powers from the consent of the governed. Whenever a government hinders pursuing Wisdom, it is the right of the governed to alter or to abolish it, and to form a new government based on what they believe most likely to help them pursue Wisdom."

Chapter 5, *A Sovereign Story of Deciding Well*, last paragraph

Changed "happiness ever more wisely, hence ever more justly, ever more truly, and ever more coherently" to "happiness ever more wisely, hence ever more justly" in the first sentence.

Changed "it should promote deciding well better than any other sovereign rights story" to "this sovereign rights story should promote pursuing Wisdom better than any other" in the third sentence.

Changed "a story of deciding well" to "a sovereign rights story for pursuing Wisdom" in the first sentence of the last footnote.

Chapter 5, *A Sovereign Story for Pursuing Wisdom*, last paragraph, last footnote

Changed "A timeless science story" to "A sovereign rights story for pursuing Wisdom" in the first sentence.

Chapter 5, *Lower Trade Barriers*, first paragraph

Changed "deciding well" to "pursuing Wisdom" in the first sentence.

Changed "decides well" to "pursues Wisdom" in the last sentence.

Chapter 5, *Promote Savings for Welfare*, entire subsection

Changed "deciding well" to "pursuing Wisdom" in all (2 occurrences).

Changed "decide well" to "pursue Wisdom" in all (8 occurrences).

Chapter 5, *Promote Deciding Well, not Stability*, title

Changed title to "*Promote Pursuing Wisdom, not Temporal Order*."

Chapter 5, *Promote Pursuing Wisdom, not Temporal Order*, second paragraph

Changed "stability" to "temporal order" in the first three sentences (3 occurrences).

Changed "deciding well" to "pursuing Wisdom" in the first two sentences (2 occurrences).

Changed "the invariant values of the Good, the Truth, Wisdom, Justice, and Beauty" to "Wisdom, hence over the Good, the Truth, Justice, Wholeness, and all of the boundless factors of pursuing Wisdom" in the last sentence.

Chapter 5, *Promote Pursuing Wisdom, not Temporal Order*, last paragraph

Changed "invariant values well" to "Wisdom" in the first sentence.

Chapter 5, Liberalism, first paragraph

Changed "decide well, which is to say on the sovereign right to decide ever more wisely" to "pursue Wisdom" in the second sentence.

Chapter 5, Liberalism, third paragraph

Changed "deciding well" to "pursuing Wisdom" in the last three sentences (2 occurrences).

Changed "decide well" to "pursue Wisdom" in the last two sentences (2 occurrences).

Chapter 7, second paragraph

Changed "decide well" to "pursue Wisdom" in the second sentence (2 occurrences).

Chapter 7, *Boyd's Grand Strategy*, first paragraph, last footnote, last two sentences

"Note that Boyd's use of the term 'ingredients' rather than 'products' was not a mistake. Deciding well is a process in which the output (products) of one cycle become the inputs (ingredients) of the next cycle."

was changed to:

"Note that deciding well is a recursive process, a process in which the products of one cycle become the ingredients of the next cycle."

Chapter 7, *Boyd's Grand Strategy*, last paragraph, footnote

"[20] Here again we can see the difference between the modern and invariant concepts of rationality. From the received view of modern science, for a model to be rational, it must be internally consistent with respect to the rules of logic. From the view of invariant science, for a model to be rational, it must not only be internally consistent with respect to the rules of logic but also be consistent with pursuing the invariant end of deciding well. From the invariant view of deciding well, the invariant factors of deciding well are things we discover rather than invent."

was deleted.

Chapter 7, *The Grandest Possible Strategy*, second paragraph

Changed "competitors'" to "adversaries'" in the last sentence.

Chapter 7, *The Grandest Possible Strategy*, last paragraph

"The grandest possible strategy is the strategy of pursuing Wisdom. Adopting this strategy calls for making the national goal pursuing Wisdom. From the theistic view of Abraham Lincoln, nations ought not to be concerned about whether God is on their side; but rather about being on the right side, for God is always right. Might may pretend to be right; but right makes might."

was changed to:

"The grandest possible strategy is the strategy of pursuing Wisdom. Adopting this strategy calls for making the national goal pursuing Wisdom. In the words of Abraham Lincoln, 'Let us have faith that right makes might, and in that faith, let us, to the end, dare to do our duty as we understand it.'[21]"

"[21] This public profession was the culmination of Lincoln's address at The Cooper Union for the Advancement of Science and Art (New York City, 27 Feb. 1860)."

Appendix A, Quotation

""Less is more." — *Robert Browning*[1]"

"[1] Browning, Robert "Andrea del Sarto," in *English Poetry III: From Tennyson to Whitman*, vol. XLII, The Harvard Classics (New York: P. F. Collier and Son, 1909–1914), reprinted in Bartelby.com, <http://www.bartleby.com/42/675.html> (24 December 2010)."

was changed to:

"“Finding a problem is like finding a diamond.” — *Toyota kaizen slogan*”

Changes in Version 2011.02.19

Preface, second to last paragraph, footnote, last sentence

“I end with a short summary of the book.”

was deleted.

Chapter 1, entire chapter

Changed “working together well” to “living and working together well” in all (5 occurrences).

Chapter 3, Public Order, second paragraph

Changed “modern social science” to “the modern economic goal of living well” in the second sentence.

Chapter 4, *Two Types of Ignorance*, last two paragraphs

Switched the order of the smallest and largest scale information.

Chapter 4, Primary Factors of Pursuing Wisdom, last paragraph, third and fourth sentences

“By definition, Wisdom is a member of this set. Other members of this set include the Good, the Truth, and Justice.”

were changed to:

“Members of this set include the Good, the Truth, and Justice.”

Chapter 4, *Academic Fields*, last paragraph

Changed “Wholeness” to “the pursuit of the Truth about the Good, Justice, and Wisdom” in the last sentence.

Chapter 4, Refining Deciding Well, first paragraph, footnote, last two sentences

"Hidden in theories that describe the world as it is in the process of becoming is a description of a prescriptive program, which is that living things are programmed to pursue the Good. Biologists call this a teleonomic program."

were changed to:

"Hidden in theories that describe the world as it is in the process of becoming is a description of a prescriptive program: living things pursue the Good."

Chapter 5, Sovereignty, first paragraph

Changed "working together well" to "living and working together well" in the first sentence.

Chapter 5, Lower Trade Barriers, first paragraph, footnote, end

Added the sentences:

"Note that the classic argument for free trade, which is the argument of comparative advantage first put forth by Robert Torrens in 1815, ignores the possibility of learning. Including this possibility strengthens the case for free trade."

Changes in Version 2011.02.28

Preface, second to last paragraph

Changed "twentieth-century analytical philosophy, nineteenth-century German idealism," to "nineteenth-century German idealism, twentieth-century analytical philosophy," in the first sentence.

Chapter 1, *A Pragmatic Model of Pursuing Wisdom*, first paragraph

Changed "simple frame for pursuing each of this" to "useful frame for pursuing each" in the third sentence.

Chapter 1, *A Pragmatic Model of Pursuing Wisdom*, second paragraph

Changed "for relating beliefs within frames" to ", which are the rules that we use to judge the relations between beliefs within a frame" in the fourth sentence.

Chapter 1, *A Pragmatic Model of Pursuing Wisdom*, last paragraph

Changed "that we use to judge relations between beliefs within a frame" to "of logic" in the second sentence.

Changed "*useful*" to "*most useful*" and "*that we use to judge relations between beliefs within a frame*" to "*of logic*" in the last sentence.

Chapter 4, *Academic Fields*, fourth paragraph, second sentence

"Like the natural sciences, the true sciences would include all fields that seek to refine our beliefs about believing well."

was deleted.

Chapter 8, beginning

Added the following:

"**The Rules of Reason**
Pursuing ends calls for overcoming our ignorance of the world. This ignorance takes the form of uncertain predictions and incomplete explanations of causation. Uncertain predictions hinder us from solving problems. Incomplete explanations hinder us from finding the best problems to solve.

"Models of the world that we use to predict and explain relate beliefs about the world in ways that are useful in pursuing ends. We may call excellence in relating beliefs *reason* and the rules we use to relate beliefs *rules of reason*.

"Excellence in relating beliefs depends on the type of end we choose to pursue. When we pursue temporal ends, we seek to solve given problems. Excellence in relating beliefs concerns reason within the frame that describes the given problem. Again, we call the rules of reason within a frame *rules of logic*. When we pursue temporal ends, the rules of reason are the rules of logic.

"When we pursue timeless ends, we seek not only to solve problems within a frame but also to find the best frame for pursuing our chosen timeless end. We may call the rules of reason for finding the best frame for pursuing a timeless end *rules of dialectics*. When we pursue timeless ends, the rules of reason include not only the rules of logic but also the rules of dialectics.

"When we pursue the invariant end of Wisdom, we seek not only to solve problems within a frame but also to find the best problems to solve in pursuing Wisdom. We may call the rules of reason for finding the best problems to solve in pursuing Wisdom *rules of Beauty beyond logic*. When we pursue the invariant end of Wisdom, the rules of reason include not only the rules of logic but also the rules of Beauty beyond logic. *When we pursue the invariant end of Wisdom, the rules of reason are the rules of Beauty.*

"**Reason in Modern Western Thought**
[This is the bud of a section that relates boundless pragmatism to modern Western thought.]

"**Summary**"

Chapter 8, last paragraph

"[This is the stub of a chapter that relates boundless pragmatism to twentieth-century analytical philosophy, nineteenth-century German idealism, and fractal geometry.]"

was deleted.

Changes in Version 2011.03.04

The following changes are the result of an edit by Pat Vaughn.

Preface, third paragraph

Changed "need to decide well" to "need in order to decide well" in the fourth sentence.

Preface, fourth paragraph

Changed "recursively applying a sequence of decision-making steps" to "repeatedly applying a sequence of decision-making steps such that the result of one cycle becomes the basis of the next cycle" in the second sentence.

Changed "sequence" to "recursive process" in the third sentence.

Preface, seventh paragraph

Changed "is *not* consistent with" to "lies beyond the bounds of" in the sixth sentence.

Changed "is consistent with" to "lies within the bounds of" in the last sentence.

Preface, eleventh paragraph

Changed "expansion of market size" to "the expansion of market size" in the last sentence.

Preface, eleventh through seventeenth paragraph

Replaced italics in chapter titles with quotations (seven occurrences).

Preface, thirteenth through sixteenth paragraph

Deleted the phrase "the chapter titled" (four occurrences).

Chapter 1, *The EOQ/RTS Example*, first paragraph

Changed "economic order quantity model" to "economic order quantity (EOQ) model" in the fourth sentence.

Changed "rapid tool setting model" to "rapid tool setting (RTS) model" in the last sentence.

Chapter 1, *The EOQ/RTS Example*, second paragraph

Changed "economic order quantity (EOQ) model" to "EOQ model" in the tenth sentence.

Chapter 1, *The EOQ/RTS Example*, third paragraph

Changed "their workers learn" to "workers learn" in the third sentence.

Chapter 1, Temporal versus Invariant Values, fourth paragraph

Changed "valid reasoning" to "reasonable" in the second to last sentence.

Chapter 1, *A Pragmatic Model of Pursuing Wisdom*, last paragraph

Changed "within this two-frame model of pursuing Wisdom" to "within this two-frame model" in the third sentence.

Chapter 1, *More Complete Models of Pursuing Wisdom*, last paragraph

Changed "to guide people" to "people to pursue" in the fifth sentence.

Chapter 2, *Pleasure and Pain*, tenth paragraph

Changed "moderate good fortune" to "good fortune" in the last sentence.

Chapter 2, Production, first paragraph, last sentence

"As we saw in the rapid tool setting (RTS) example, producing well calls for learning-by-doing., for pushing back our efficiency frontiers."

was changed to:

"As we saw in the rapid tool setting (RTS) example, producing well calls for learning-by-doing. In modern economic terms, it calls for pushing back our production-possibility frontiers."

Chapter 3, *Zero Public Entropy*, first paragraph

Changed "that classical physics predicts" to "than classical physics predicts" in the second to last sentence.

Chapter 3, *Decision-Oriented Interpretations of Decision Science*, second paragraph

Italicized "statistical" in the first sentence.

Chapter 3, The Elephant in the Room, last paragraph

Changed "to solve, the essential " to "to solve the essential" in the second sentence.

Chapter 4, Useful Reminders, second paragraph

Changed "don't" to "do not" in the third sentence.

Chapter 5, *A Sovereign Story for Pursuing Wisdom*, second paragraph

Changed "believe most" to "believe is most" in the third sentence.

Chapter 5, *Lower Trade Barriers*, first paragraph

Changed "to a person" to "to us" in the last sentence.

Chapter 7, *Prelude to Boyd's Idea of Competing in Time*, first paragraph

Changed ", and" to "and," in the last sentence.

Chapter 7, *Boyd's Grand Strategy*, first paragraph, last footnote

Changed "recursive process" to "a recursive process" in the last sentence.

Changes in Version 2011.03.12

Preface, fourth paragraph

Changed "subject to constraints" to "a public process subject to constraints" in the third sentence.

Preface, eighth paragraph, last two sentences

"Unlike the Aristotelian pursuit, this pursuit involves not only rules that bind beliefs together into logical frameworks, but also rules for binding logical frameworks together into a

coherent whole. The source of this coherence is the symmetry of pursuing the timeless end of deciding well."

were changed to:

"Unlike the Aristotelian pursuit, this pursuit involves not only rules that bind beliefs together into coherent models of the world, but also rules for binding these models together into a coherent whole. The source of the coherence for binding these models together is the symmetry of pursuing the timeless end of deciding well."

Chapter 1, Choosing Frames Well, first paragraph, last two sentences

"Over time, we refine these structures using rules for refining these structures. We may call the resulting logically coherent structures for reducing our sensations of the world to concepts *frames*.[5]"

"[5] We ought not to confuse frames with unrefined structures of concepts, which we may call conceptual frameworks. Frames provide us with a single, logically coherent view of the world. To prevent logical mistakes known as fallacies of ambiguity, frames do not contain terms that refer to more than one concept. In contrast, conceptual frameworks may contain terms that refer to more than one concept. This ambiguity allows the creation of useful models of reality that are not supported by reason. As we shall see, the endless process of refining everyday thinking includes replacing ambiguous terms with unambiguous terms. For now, we may simply say that conceptual frameworks are to everyday thinking what frames are to science."

was changed to:

"Over time, we reduce the ambiguity of these structures. Sources of ambiguity within these structures include terms that refer to more than one concept and pairs of concepts defined in terms of one another. We may call conceptual structures from which we have removed all removable ambiguity *frames*."

Chapter 1, Temporal versus Invariant Values, last paragraph

Changed "logical view" to "view that does not allow learning" in the third sentence.

Changed "the boundlessly pragmatic view put forth in this work" to "a view that does allow learning by doing" in the third sentence.

Chapter 1, *A Pragmatic Model of Pursuing Wisdom*, third paragraph, first two sentences

"This single-frame model follows the rules of logic, which are the rules that we use to judge the relations between beliefs within a frame. However, it is useless as a tool for helping us find problems to solve in pursuing Wisdom."

were appended to the third paragraph and changed to:

"The tautological way in which we define the timeless end of pursuing Wisdom makes this single-frame model useless as a tool for helping us find problems to solve in pursuing Wisdom."

Chapter 1, *A Pragmatic Model of Pursuing Wisdom*, last paragraph

"This two-frame model helps us find problems to solve in pursuing Wisdom by telling us we need to weed out all problems that are not consistent with pursuing the Truth. However, this usefulness comes at the cost of consistency with the rules of logic. For example, from within the frame of pursuing Wisdom within this two-frame model, we pursue Wisdom; from within the frame of pursuing the Truth within this two-frame model of pursuing Wisdom, we pursue the Truth; and from within this two-frame model of pursuing Wisdom as a whole, we pursue both Wisdom and the Truth. The statement that we pursue the Truth is true from within the frame of pursuing the Truth and from within the model as a whole, but not from within the frame of pursuing Wisdom. Similarly, the statement that we pursue Wisdom is true from within the frame of pursuing Wisdom and from within the model as a whole, but not from within the frame of pursuing the Truth. *In general, any model of pursuing a timeless end that calls for learning by doing can never be both most useful in pursuing the timeless end and completely consistent with the rules of logic*."

was changed to:

"This two-frame model helps us find problems to solve in pursuing Wisdom by weeding out problems that are not consistent with pursuing the Truth. However, this usefulness comes at the cost of consistency with the rules of logic. For example, the statement that we pursue the Truth is true from within the frame of pursuing the Truth and from within the multiple-frame model as a whole, but not from within the frame of pursuing Wisdom. Similarly, the statement that we pursue Wisdom is true from within the frame of pursuing Wisdom and from within the model as a whole, but not from within the frame of pursuing the Truth.[12]"

"[12] For more on this, read the chapter on reasoning well."

Chapter 1, *More Complete Models of Pursuing Wisdom*, last paragraph, second footnote

"More accurately, this thought experiment calls for us to imagine what we would want if before we were born we had complete knowledge of everything except knowledge of the circumstances of our birth or births."

was deleted.

Chapter 1, Refining Everyday Thinking, second paragraph

Changed "logical" to "beautiful" in the first sentence.

Chapter 4, A Crude Look at the Whole, first paragraph, first footnote

Changed "additional turbulence" to "turbulence" in the last sentence.

Chapter 8, The Rules of Reason, title

Changed title to "Rules of Reason."

Chapter 8, Rules of Reason, entire section

"**Rules of Reason**
Pursuing ends calls for overcoming our ignorance of the world. This ignorance takes the form of uncertain predictions and incomplete explanations of causation. Uncertain predictions hinder us from solving problems. Incomplete explanations hinder us from finding the best problems to solve.

"Models of the world that we use to predict and explain relate beliefs about the world in ways that are useful in pursuing ends. We may call excellence in relating beliefs *reason* and the rules we use to relate beliefs *rules of reason*.

"Excellence in relating beliefs depends on the type of end we choose to pursue. When we pursue temporal ends, we seek to solve given problems. Excellence in relating beliefs concerns reason within the frame that describes the given problem. Again, we call the rules of reason within a frame *rules of logic*. When we pursue temporal ends, the rules of reason are the rules of logic.

"When we pursue timeless ends, we seek not only to solve problems within a frame but also to find the best frame for pursuing our chosen timeless end. We may call the rules of reason for finding the best frame for pursuing a timeless end *rules of dialectics*. When we pursue timeless ends, the rules of reason include not only the rules of logic but also the rules of dialectics.

"When we pursue the invariant end of Wisdom, we seek not only to solve problems within a frame but also to find the best problems to solve in pursuing Wisdom. We may call the rules of reason for finding the best problems to solve in pursuing Wisdom *rules of Beauty beyond logic*. When we pursue the invariant end of Wisdom, the rules of reason include not only the rules of logic but also the rules of Beauty beyond logic."

was deleted.

Chapter 8, Reason in Modern Western Thought, entire section

"**Reason in Modern Western Thought**
[This is the bud of a section that relates boundless pragmatism to modern Western thought.]"

was changed to:

"**Temporal, Timeless, and Invariant Reason**
[This is the bud of several sections that describe rules for relating useful beliefs.]"

Changes in Version 2011.03.16

Chapter 7, second paragraph

Changed "Pursuing" to "Further, pursuing" in the third sentence.

Chapter 7, The Scope of Reason, last paragraph, first sentence

"When combined with the inexhaustibility of knowledge, the tendency to adapt an ever more expansive and coherent view of the problems we face suggests a natural dynamic in the evolution of culture:"

was changed to:

"**The Ever-Increasing Pace of Change**
We are programmed to pursue the timeless end of living well. Pursuing this timeless end well calls for learning well, which in turn calls for taking an ever more expansive and coherent view of the problems we face. These relations suggest a natural dynamic in the evolution of culture:"

Chapter 7, The Scope of Reason, last paragraph, footnote

"[10] As we have seen throughout this work, learning ever more about what ends we ought to pursue conflicts with temporal views of competing well, which do not allow for learning. Learning ever more about what ends we ought to pursue also conflicts with timeless views of competing well, which allow for learning ever more about means but not about ends. We can see this limitation in timeless social science models, which concern the evolution of cooperation. We can also see this limitation in timeless biological models, which concern how species pursue the timeless end of living well. When used as tools for helping people find problems to solve, both of these types of timeless models tend to blind us to pursuing all boundless factors of pursuing Wisdom. We can avoid being blinded by the models we use to find problems to solve by using invariant models to help us find problems to solve. These models use a concept of rationality that considers symmetry as well as logic."

was deleted.

Chapter 7, *Prelude to Boyd's Idea of Competing in Time*, heading

Deleted the heading, "*Prelude to Boyd's Idea of Competing in Time*."

Chapter 7, *Temporal OODA Loop Analysis*, last paragraph, first footnote

"[14] As we saw in the EOQ/RTS example, the inexhaustibility of knowledge effectively turns temporal problems that may involve learning into timeless problems. Hence, the only problems we ought to consider to be temporal problems are those in which we are certain that learning plays no significant role."

was changed to:

"[14] As we saw in the EOQ/RTS example, the only problems we ought to consider to be temporal problems are those in which we are certain that learning plays no significant role."

Chapter 7, *Temporal OODA Loop Analysis*, last paragraph, last footnote

Added the sentence:

"This slide presentation is available in the Boyd archive of Project White Horse <http://www.projectwhitehorse.com/boydsarchive.htm> (15 March 2011)."

Changes in Version 2011.03.22

Chapter 1, title

Changed "*Confucius*" to "*Kong Qiu*" in the introductory quote.

Chapter 1, title footnote

Added the sentence:

"Kong Qiu is commonly known by various courtesy names, which include Confucius (Master Teacher Kong)."

Chapter 7, title

Changed "*Sunzi*" to "*Sun Wu*" in the introductory quote.

Chapter 7, title footnote

Added the sentence:

"Sun Wu is commonly known by various courtesy names, which include Sunzi (Master Sun)."

Chapter 7, The Ever-Increasing Pace of Change, entire section

"**The Ever-Increasing Pace of Change**
We are programmed to pursue the timeless end of living well. Pursuing this timeless end well calls for learning well, which in turn calls for taking an ever more expansive and coherent view of the problems we face. These relations suggest a natural dynamic in the evolution of culture:

People who take a more expansive and coherent view of the problems they face tend to make better use of knowledge of how to live well than do their competitors. This affects their competitors in two ways. First, it provides competitors with an example of how to live better in the current environment. Second, it changes the environment in a way that is relatively better for people who take a more expansive and coherent view than those who take a less expansive and coherent view. In particular, it increases the pace of change. This shortens the time people have to adapt to change, which in turn increases the value of knowledge related to adapting to change. This knowledge includes knowledge of what people need in order to adapt well to a wide variety of possible changes. People acquire this knowledge by taking a more expansive and coherent view of the problems they face.

This natural dynamic calls for us to learn ever more about what ends we ought to pursue, which in turn calls for us to use a concept of rationality that considers not only logic but also the symmetry of pursuing Wisdom."

was changed to:

"Competing well in the information age calls for replacing non-knowledge resources, including time, with knowledge resources. Replacing time with knowledge increases the pace of change. Adapting to an ever-increasing pace of change calls for taking an ever more expansive and coherent view of the world. People who understand this natural dynamic can force their competitors to take an ever more expansive and coherent view of the world by deciding well ever more quickly."

Changes in Version 2011.03.31

Acknowledgements, second paragraph

Changed "exposed me to" to "introduced me to the problems of language through" in the third sentence.

Acknowledgements, second to last paragraph

"Students of Friedrich Hayek will recognize the homage I paid him in the dedication. I owe more to this self-proclaimed member of the party of life than to any other political economist. "We shall not grow wiser before we learn that much that we have done was very foolish.""

was deleted.

Preface, fourteenth paragraph

Changed "description" to "explanation" in the last sentence.

Preface, second to last paragraph

Changed "final" to "last" and "nineteenth-century German idealism, twentieth-century analytical philosophy" to "dialectical philosophy, analytical philosophy" in the first sentence.

Chapter 1, *The EOQ/RTS Example*, last paragraph, footnote

Changed "the appendix" to "Appendix A" in the last sentence.

Chapter 1, *Primary Factors of Pursuing Wisdom*, entire section

"***Primary Factors of Pursuing Wisdom***
Pursing Wisdom calls for us to refine our beliefs about pursuing Wisdom. When we are completely ignorant about the world, including ourselves, it is as reasonable for us to be completely open-minded about what values we ought to use to guide our decisions. As we learn ever more about the world, it is reasonable for us to become ever more discriminating about what values we use to guide our decisions. When we learn how foolish it is to ignore what we may learn by doing, it is reasonable for us to weed out values based on temporal ends. When we learn how pursuing any timeless end well calls for us to pursue Wisdom, which in turn calls for us to pursue all of the boundless factors of pursuing Wisdom, it is reasonable for us to weed out values that are not boundless factors of pursuing Wisdom.

"Some boundless factors of pursuing Wisdom are subordinate to others. For example, the timeless end of competing well (Winning) is subordinate to the timeless end of living and working together well (Justice). Competing well is a means of discovering which belief or set of beliefs best helps us pursue Wisdom. Living and working together well includes working together to discover which beliefs best help us pursue Wisdom. Similarly, the timeless end of contemplating well (Beauty) and the timeless end of reasoning well (Reason) are subordinate to the timeless end of believing well (the Truth). Contemplating well and reasoning well are parts of refining our beliefs about pursuing Wisdom.

"We can imagine a set of boundless factors of pursuing Wisdom that are subordinate only to Wisdom. We may call these *primary factors of pursuing Wisdom*. Members of this set include the Good, the Truth, and Justice. To include Wholeness in this set is to claim that Wholeness is not subordinate to the Good. This belief currently is, and will likely forever remain, a matter of faith, a matter of belief beyond reason."

was changed to:

"***Beauty as a Guide to Deciding Well***
From the view of pursuing Wisdom using the multiple-frame model of pursuing Wisdom, pursuing the Truth about Wisdom calls for us to pursue all of the invariant factors of deciding

well. This is a benefit, not a burden. It provides us with a more certain way of testing problems before we address them. If a problem is consistent with all of our beliefs about the invariant factors of deciding well, then it rings true. We have found a beautiful problem to solve.

"The most obvious benefit of this multiple-frame model for deciding well is that it allows us to use more of what we know about the world than any single-frame model of the world does. This is true whether we use it to deliberate, to form and judge decision-rules, or to form and judge habits. A less obvious benefit is that it provides us with a robust means of producing new knowledge through failure. In this, it is like Toyota production system and Karl Popper's falsification approach to science. However, unlike these other learning-by-doing systems, it is generally useful. In this, it is like mathematics, logic, and other general means for reasoning well that we discover rather than invent. As we shall see, its form of reasoning is the invariant alternative to the timeless reasoning of dialectics."

Chapter 2, *Tools for Pursuing Wisdom*, title

Changed "*Wisdom*" to "*the Good*."

Chapter 3, *Zero Public Entropy*, first paragraph, last footnote, seventh sentence

"This is consistent with the self-similar nature of the process that creates these networks, with the power law distribution of income, and with the fractal distribution of commodity price changes over time."

was deleted.

Chapter 3, *Zero Public Entropy*, last paragraph, last sentence

"We may call the problems whose solutions fall within the bounds of our chosen problem *normal problems* and those that surpass the bounds of our chosen problem *revolutionary problems*."

was changed to:

"We may call the problems whose solutions fall within the bounds of our chosen timeless problem as we currently understand it *normal problems* and those that surpass the bounds of our chosen timeless problem as we currently understand it *revolutionary problems*."

Chapter 4, *A Crude Look at the Whole*, second paragraph, footnote

Changed "the appendix" to "Appendix A" in the last sentence.

Chapter 6, A Common Timeless End, first paragraph

"Materialists and dualists can find a common timeless end in the timeless end of revering life well, which we may call *Wholeness*. From both views, Wholeness is a boundless factor of pursuing Wisdom. Pursuing Wisdom calls for us to pursue Wholeness. In turn, pursuing Wholeness calls for us to pursue Wisdom. From a materialist view, Wholeness is subordinate to the Good. From a dualist view, Wholeness is a primary factor of pursuing Wisdom."

was changed to:

"From the materialist view of pursuing Wisdom using the multiple-frame model of pursuing Wisdom, Wholeness is subordinate to the Good: we become part of something infinitely larger than ourselves in order to live well. From the dualist view of pursuing Wisdom using the multiple-frame model of pursuing Wisdom, the Good is subordinate to Wholeness: we live well in order to become part of something infinitely larger than ourselves. Which of these views is better currently is, and will likely forever remain, a matter of faith, a matter of belief beyond reason. From both of these views, Wholeness is a boundless factor of pursuing Wisdom: pursuing Wisdom calls for us to pursue Wholeness and pursuing Wholeness calls for us to pursue Wisdom. It is only when the lack of resources for pursuing Wisdom causes us to break the symmetry of pursuing Wisdom that we must choose between pursuing the Good and pursuing Wholeness. Pursuing Wisdom well makes it ever less likely that we need to make this decision."

Chapter 7, The Scope of Reason, first paragraph

Inserted the following paragraph:

"Pursuing ends well calls for us to overcome our ignorance of the world. This ignorance takes the form of uncertain predictions and incomplete explanations of causation. Uncertain predictions hinder us from solving problems well. Incomplete explanations hinder us from finding the best problems to solve. Models of the world that we use to predict and explain relate beliefs about the world in ways that are useful in predicting and explaining the world. We may call excellence in relating beliefs *reason*."

Chapter 7, *The Grandest Possible Strategy*, first paragraph

Changed "make the corner positions immune" to "protect the corner positions" in the first sentence.

Chapter 8, Temporal, Timeless, and Invariant Reason, entire section

"**Temporal, Timeless, and Invariant Reason**
[This is the bud of several sections that describe rules for relating useful beliefs.]"

was changed to:

"**Useful Reasoning**
Again, pursuing ends well calls for us to overcome our ignorance of the world. This

ignorance takes the form of uncertain predictions and incomplete explanations of causation. Uncertain predictions hinder us from solving problems well. Incomplete explanations hinder us from finding the best problems to solve. Models of the world that we use to predict and explain relate beliefs about the world in ways that are useful in predicting and explaining the world. We may call excellence in relating beliefs *reason*. We may also call and the rules we use to relate beliefs well the *rules of reason*.

"Excellence in relating beliefs depends on the type of end we choose to pursue. When we pursue temporal ends, we seek to find the best solution to a given problem that is bounded in time. Excellence in relating beliefs concerns reason within the frame that we use to describe this temporal problem. We may call the set of rules that we use to relate these beliefs the *rules of logic*.

"When we pursue timeless ends, we seek not only to seek to solve given temporal problems, but also to find problems to solve. Excellence in relating beliefs concerns not only relating beliefs within the frames that we use to solve temporal problems, but also in relating beliefs within the frames that we use to find problems to solve. We may call the set of rules that we use to relate beliefs within the frames that we use to find problems to solve in pursuing timeless ends the *rules of dialectics* after the dialectic form of discourse that Socrates used to explain what timeless ends and the means to timeless ends are not.

"Excellence in solving temporal problems calls for models of the world that are completely unambiguous. In contrast, excellence in finding problems to solve in pursuing timeless ends calls for models that are ambiguous with respect to the timeless end and the means of pursuing the timeless end. If these two concepts were not ambiguous, there would be no possibility of finding better means for finding problems to solve. The least ambiguous means of defining these two concepts is to define each in terms of the other.

"Unlike logic, dialectics reminds us of our fallibility. Given our incomplete knowledge of how to decide well in pursuing timeless ends, we make mistakes. In terms of this work, we embed mistakes into our networks of knowledge-in-use. In terms of nineteenth-century German idealism, the internal contradictions of the models we use to guide our actions build up to a crisis that leads us to change our beliefs. Knowledge of our fallibility in pursuing timeless ends encourages us to examine the tools we use to guide our actions. However, when we combine this knowledge with the belief that there are experts who know more than we do about how we ought to live, we tend to give too much power to experts. In contemplating our fallibility, we ought to follow the personal example of Socrates, not the politics of Plato.

"The rules of dialectics help us find problems to solve in pursuing timeless ends. As we saw in the first chapter, finding the best problem to solve in pursuing a timeless end calls for us to choose a frame, which in turn calls for us to choose a frame, which in turn calls for us to choose a frame, and so on to infinity. We can address this infinitely large problem well by pursuing Wisdom using the multiple-frame model of pursuing Wisdom.

"When we pursue Wisdom using the multiple-frame model of pursuing Wisdom, we seek problems that ring true with the pursuit of all boundless factors of pursuing Wisdom. These boundless factors are timeless ends. Hence, the set of rules for pursuing Wisdom contains not only rules that maintain ambiguity in the form of tautological definitions of ends and means, but also rules for reducing ignorance within this ambiguity through experimentation, through learning-by-doing. We may call the rules for pursuing Wisdom using the multiple-frame model of pursuing Wisdom the *rules of Reason*.

"**Natural Reasoning**

The multiple-frame model of pursuing Wisdom is something that we discover, not something we invent. It emerges from the combination of the inexhaustibility of knowledge and the internal drive for all living things to seek to survive and thrive. In seeking to make the best use of knowledge, living beings learn to cooperate with one another.

"From the view of modern biology, living beings cooperate well in order to compete well. In other words, pursuing the timeless end of cooperating well is subordinate to pursuing the timeless end of competing well. From this view, people who seek to cooperate before they seek to compete, to look first for win-win solutions to resource problems before they seek to compete over resources, are an anomaly.

"In contrast, from the view of the multiple-frame model of pursuing Wisdom, living beings compete well in order to cooperate well, in order to make the best use of knowledge resources in living well. In other words, pursuing the timeless end of competing well is superior to pursuing the timeless end of competing well. Only when living beings lack the means to cooperate do they compete. Living beings that seek to compete before they seek to cooperate are the special case of living beings that have not yet developed the means to pursue Wisdom using the multiple-frame model of pursuing Wisdom. Given geological periods of time, even the lowest form of life may evolve into a form capable of understanding the multiple-frame model of pursuing Wisdom.

"Which of these two views of the relation between cooperating well and competing well is the better view for helping us find problems to solve, hence for explaining the world? In theory, the multiple-frame model is more complete, hence better than the biological model at helping us find problems to solve. In practice, the multiple-frame model, which has us seek win-win solutions before choosing to compete, is also better than the biological model at helping us find problems to solve.

"People who seek empirical evidence supporting one or the other of these theories would be wise to study the inverse power law distributions of the products of economic activity. These include the distributions of wealth and income studied by Vilfredo Pareto and the distribution of changes in commodity prices studied by Benoit Mandelbrot. Such distributions are the result of some self-similar process or processes. From the view of modern biology, it is not clear what this process or these processes might be. From the view of the multiple-frame model of pursuing Wisdom, it is clear that this process is pursuing Wisdom."

"[3] At the beginning of the twentieth century, modern analytical philosophers sought to reduce the whole of human knowledge to a logically coherent and complete frame. This misguided effort created a backlash against not only logic, but also reason. For more on this, see Appendix B."

Changes in Version 2011.04.15

Preface, sixth and seventh paragraphs

"This essential process of pursuing the timeless end of deciding well calls for us to find and solve problems well. Models that help us explain sensations of the world help us find problems to solve. Models that help us predict sensations of the world help us solve given problems.

"To improve the quality of the models we use to predict and explain our sensations of the world, we need means of judging these models. The pragmatic means of judging models is to judge them by their usefulness. We use models that help us explain sensations in order to find problems to solve. We ought to judge these models by how well they help us find problems to solve. We can do so by judging how well these models ring true with what we currently know about pursuing the timeless end of deciding well. This lies beyond the bounds of modern science. We use models that help us predict sensations to solve given problems. We ought to judge these models by how well they help us predict sensations. This lies within the bounds of modern science."

were deleted.

Preface, new sixth paragraph

Changed "the pursuit of the timeless end of deciding well" to "this intertwined" in the first sentence.

Added the last sentence:

"The form of reasoning that underlies this intertwined pursuit is neither dialectical nor logical, but rather a synthesis of dialectical and logical reasoning."

Preface, tenth paragraph

Changed "alternatives" to "complements" in the first sentence.

Chapter 1, *Beauty as a Guide to Deciding Well*, last paragraph

Deleted "and Karl Popper's falsification approach to science" from the fourth sentence.

Chapter 2, Invariant Tools for Living Well, second paragraph

Changed "alternatives" to "complements" in the second sentence.

Chapter 3, The Elephant in the Room, first paragraph

Changed "pursuing Wisdom" to "pursuing Wisdom using the multiple-frame model of pursuing Wisdom" in the first sentence.

Chapter 7, The Scope of Strategy, second paragraph

Changed "of the kinetic phase of" to "of" in the first sentence.

Chapter 7, The Scope of Strategy, third paragraph

Changed "reduce close-in aerial combat to energy relations" to "consider aircraft performance in terms of energy relations" in the third sentence.

Chapter 7, The Scope of Strategy, fourth paragraph

Changed "most close-in aerial combat situations" to "terms of overall aircraft performance" in the second sentence.

Chapter 7, The Scope of Strategy, last paragraph

Changed "Riccioni," to "Riccioni, Chuck Myers, Tom Christie," in the second sentence.

Chapter 7, *Temporal OODA Loop Analysis*, first paragraph

Changed "officially retired" to "retired" in the first sentence.

Chapter 7, *Temporal OODA Loop Analysis*, third paragraph

"We can use Boyd's OODA loop model to solve temporal problems.[14] One such problem is the problem of predicting the relative performance of fighter planes in close-in aerial combat. Although we can use E-M theory to do this, there are cases in which E-M theory fails to predict well. The case that most concerned Boyd was the discrepancy between the actual and theoretical results of combat between F-86 pilots and MiG-16 pilots during the kinetic phase of the Korean War. According to E-M theory, F-86 pilots should not have been as successful against MiG-16 pilots as they were. The stock answer for this theoretical anomaly was that F-86 pilots were better trained and had more experience than MiG-15 pilots. While this was true in combat against most North Korean and Chinese pilots, it was not true against most Soviet pilots. Boyd used his OODA loop model to look deeper. He concluded that F-86 pilots were able to overcome the relative deficiencies in their airplanes that E-M theory exposed with g-suits, a bubble canopy for better visibility, and a hydraulic control system that was both more responsive and less physically taxing. These factors allowed F-86 pilots to

observe, orient, decide, and act more quickly than their opponents. Unlike American P-38 pilots fighting against Japanese pilots in slower, but more maneuverable fighter planes a decade earlier, F-86 pilots fighting MiG-15 pilots were not limited to a single tactic. This made them appear more unpredictable and threatening to their opponents. It also made it possible to "get inside the decision cycles" of their opponents, where they could remain relatively safe until their opponents made an exploitable mistake.[15]"

was changed to:

"We can use Boyd's OODA loop model to solve temporal problems.[14] One such problem is the problem of predicting the performance of fighter planes in close aerial combat. There are cases in which E-M theory fails to predict well. The case that most concerned Boyd was the discrepancy between the actual and theoretical results of combat between F-86 pilots and MiG-15 pilots. According to analysis based solely on E-M theory, F-86 pilots should not have been as successful against MiG-15 pilots as they were. Boyd used his OODA loop model to look deeper. He concluded that F-86 pilots were able to overcome the relative deficiencies in their airplanes using tools that allowed them to observe, orient, decide, and act more quickly than their opponents. These tools included bubble canopies for better visibility, g-suits for greater resistance to acceleration, and hydraulic controls for less physically exhausting maneuvering. Unlike American P-38 pilots fighting against Japanese pilots in slower, but more maneuverable fighter planes a decade earlier, F-86 pilots fighting MiG-15 pilots were not limited to a single tactic. This made them appear more unpredictable and threatening to their opponents. It also made it possible to "get inside the decision cycles" of their opponents, where they could remain relatively safe until their opponents made an exploitable mistake.[15]"

Chapter 8, Useful Reasoning, first paragraph

Changed "we use" to "that we use" in the last sentence.

Chapter 8, Useful Reasoning, fifth paragraph, third sentence

"In terms of nineteenth-century German idealism, the internal contradictions of the models we use to guide our actions build up to a crisis that leads us to change our beliefs."

was reduced to a footnote.

Changes in Version 2011.04.23

Chapter 1, Temporal versus Timeless Values, last paragraph, last sentence

"However, from a view that does allow learning by doing, we have learned that pursuing Wisdom ever better calls for us to pursue the Truth ever better."

was changed to:

"However, from a view that does allow learning by doing, we have learned that pursuing Wisdom ever better calls for us to pursue the Truth ever better, and that pursuing the Truth ever better calls for us to pursue Wisdom ever better. In short, there exists a virtuous circle between pursuing Wisdom and pursuing the Truth."

Chapter 1, *A Pragmatic Model of Pursuing Wisdom*, first paragraph

Changed "this insight" to "this insight into the relation between pursuing the Truth and pursuing Wisdom" in the first sentence.

Changes in Version 2011.04.25

Preface, seventh paragraph

Changed "create" to "invent" in the last sentence.

Chapter 1, *More Complete Models of Pursuing Wisdom*, third paragraph, footnote

Deleted "(theory of knowledge)" from the first sentence.

Deleted "(pursuing the Good)" and "(pursuing all of the boundless factors of deciding well)" from the third sentence.

Chapter 1, *More Complete Models of Pursuing Wisdom*, second paragraph

Changed "for deciding well" to "of pursuing Wisdom" in the first sentence.

Chapter 1, *More Complete Models of Pursuing Wisdom*, last paragraph, last sentence

"Adding the frame of pursuing Wholeness to our multiple-frame model of pursuing Wisdom gives us another way to judge problems to solve in pursuing Wisdom."

was replaced by the following paragraph:

"With each new boundless factor we add to our multiple-frame model of pursuing Wisdom, we gain greater understanding of what it is to pursue Wisdom. With this greater understanding, we can more readily judge whether the problems we are considering are consistent with pursuing Wisdom. If a problem is consistent with all of our beliefs about pursuing the boundless factors of deciding well, then it rings true. We have found a beautiful problem to solve.

"The most obvious benefit of this multiple-frame model of pursuing Wisdom is that it allows us to use more of what we know about the world than any single-frame model of the world does. This is true whether we use it to deliberate, to form and judge decision-rules, or to form and judge habits. A less obvious benefit is that it provides us with a robust means of creating knowledge through failure. In this, it is like Toyota production system. However, unlike the Toyota production system, it is something that is universally useful."

Chapter 1, Beauty as a Guide to Deciding Well, entire subsection

"***Beauty as a Guide to Deciding Well***
From the view of pursuing Wisdom using the multiple-frame model of pursuing Wisdom, pursuing the Truth about Wisdom calls for us to pursue all of the invariant factors of deciding well. This is a benefit, not a burden. It provides us with a more certain way of testing problems before we address them. If a problem is consistent with all of our beliefs about the invariant factors of deciding well, then it rings true. We have found a beautiful problem to solve.

"The most obvious benefit of this multiple-frame model of pursuing Wisdom is that it allows us to use more of what we know about the world than any single-frame model of the world does. This is true whether we use it to deliberate, to form and judge decision-rules, or to form and judge habits. A less obvious benefit is that it provides us with a robust means of producing new knowledge through failure. In this, it is like Toyota production system. However, unlike these other learning-by-doing systems, it is more generally useful. In this, it is like mathematics, logic, and other means for reasoning well that we discover rather than invent. As we shall see, its form of reasoning is the invariant alternative to the timeless reasoning of dialectics."

were deleted.

Chapter 2, A Strategy for Learning Well, first paragraph

Changed "pursue Wisdom" to "pursue Wisdom using the multiple-frame model of pursuing Wisdom" in the last sentence.

Chapter 5, *Promote Savings for Welfare*, last paragraph, last footnote, end

Added the sentences:

"From the invariant view of deciding well, the natural distribution of income of people deciding well is likely to follow an inverse power law. If so, policies for redistributing income will hinder deciding well. Far better are policies for ensuring that people have what they need to decide well."

Chapter 5, Liberalism, last paragraph

Changed "learn what they now improperly call humanity by pursuing Wisdom" to "best learn what they improperly call humanity by pursuing Wisdom using the multiple-frame model of pursuing Wisdom" in the last sentence.

Chapter 6, *Schweitzer's Universal Spiritual Need*, fourth paragraph

Changed " involve" to "have" in the first sentence.

Chapter 6, *Worldly Benefits of Detachment*, last paragraph

Changed "The classic example" to "A classic example" in the second sentence.

Chapter 6, Experiencing the Mysterious, second paragraph

Deleted the phrase "from the temporal view of modern economics," from the last sentence.

Chapter 6, Experiencing the Mysterious, last paragraph

Deleted the phrase "during life" from the third sentence.

Chapter 6, *Einstein's Twin Warnings*, last paragraph

Changed "in invariant terms" to "in terms of the multiple-frame model of pursuing Wisdom" in the second sentence.

Italicized the third sentence: "*His house has room for good Samaritans.*"

Chapter 6, A Common Timeless End, first paragraph

Changed "better" to "true" in the third sentence.

Chapter 6, A Common Timeless End, first paragraph, last two sentences

"It is only when the lack of resources for pursuing Wisdom causes us to break the symmetry of pursuing Wisdom that we must choose between pursuing the Good and pursuing Wholeness. Pursuing Wisdom well makes it ever less likely that we need to make this decision."

were changed to:

"The lack of resources for pursuing Wisdom may cause us to choose between pursuing the Good and pursuing Wholeness. Pursuing Wisdom well makes it ever less likely that we will need to make this decision."

Chapter 8, Natural Reasoning, fifth paragraph

Changed "inverse power law distributions" to "power law distributions" in the first sentence.

Chapter 8, Natural Reasoning, third paragraph

Changed "geological" to "cosmological" in the last sentence.

Appendix, *Inducing Knowledge*, title

Changed title to "*Inducing the Creation of Knowledge*."

Appendix, *Inducing the Creation of Knowledge*, fourth paragraph

Changed "inducing knowledge" to "inducing the creation of knowledge" in the first sentence.

Changes in Version 2011.04.30

Chapter 1, *The Need for Timeless Frames*, first bullet point

Changed "expensive" to "costly" in the first sentence.

Chapter 1, *The Need for Timeless Frames*, second bullet point

Changed "expensive" to "costly" in the first sentence.

Chapter 1, *The Need for Timeless Frames*, third bullet point

Changed "Again, once we have learned how to make products" to "Once we have learned how to make functionally identical products" in the last sentence.

Chapter 1, Timeless versus Invariant Values, fifth paragraph

Changed "domestic cats" to "house cats" in the seventh sentence.

Chapter 1, *A Pragmatic Model of Pursuing Wisdom*, last paragraph

"This two-frame model helps us find problems to solve in pursuing Wisdom by weeding out problems that are not consistent with pursuing the Truth. However, this usefulness comes at the cost of consistency with the rules of logic. For example, the statement that we pursue the Truth is true from within the frame of pursuing the Truth and from within the multiple-frame model as a whole, but not from within the frame of pursuing Wisdom. Similarly, the statement that we pursue Wisdom is true from within the frame of pursuing Wisdom and from within the model as a whole, but not from within the frame of pursuing the Truth.[12]"

"[12] For more on this, read the chapter on reasoning well."

was changed to:

"We can use this multiple-frame model to weed out problems that are not consistent with both pursuing Wisdom and pursuing the Truth. Viewing potential problems to solve from more than one frame gives us a better chance of avoiding the problems of abstraction that arise from viewing the world from a single frame."

Chapter 1, *More Complete Models of Pursuing Wisdom*, title

Changed "*More*" to "*Ever More*" in the title.

Chapter 1, *Ever More Complete Models of Pursuing Wisdom*, last paragraph

Changed "it is something that is" to "it is" in the last sentence.

Chapter 6, *Worldly Benefits of Detachment*, fourth paragraph

Changed "In religious terms, she" to "She" in the last sentence.

Chapter 6, *Worldly Benefits of Detachment*, last paragraph

"Competing well in the information age calls for replacing non-knowledge resources, including time, with knowledge resources. Replacing time with knowledge increases the pace of change. Adapting to an ever-increasing pace of change calls for taking an ever more expansive and coherent view of the world. Adapting to an ever-increasing pace of change calls for taking an ever more expansive and coherent view of the world. People who understand this natural dynamic can force their competitors to take an ever more expansive and coherent view of the world by deciding well ever more quickly."

was moved to the next section and changed to:

"Deciding well calls for replacing non-knowledge resources with knowledge resources. These non-knowledge resources include time. Replacing time with knowledge increases the pace of change. Adapting to an ever-increasing pace of change well calls for taking an ever more expansive and coherent view of the world. Adapting to an ever-increasing pace of change calls for taking an ever more expansive and coherent view of the world. People who understand this natural dynamic can force their competitors to take an ever more expansive and coherent view of the world by deciding well ever more quickly."

Chapter 6, A Common Timeless End, first paragraph

Deleted ", and will likely forever remain," from the third sentence.

Changed "decision" to "choice" in the last sentence.

Chapter 7, The Scope of Reason, eleventh paragraph

Changed "symmetry" to "the symmetry of pursuing Wisdom using the multiple-frame model of pursuing Wisdom" in the last sentence.

Chapter 8, Useful Reasoning, last paragraph

"When we pursue Wisdom using the multiple-frame model of pursuing Wisdom, we seek problems that ring true with the pursuit of all boundless factors of pursuing Wisdom. These boundless factors are timeless ends. Hence, the set of rules for pursuing Wisdom contains not only rules that maintain ambiguity in the form of tautological definitions of ends and means, but also rules for reducing ignorance within this ambiguity through experimentation, through learning-by-doing. We may call the rules for pursuing Wisdom using the multiple-frame model of pursuing Wisdom the *rules of Reason*."

to:

"When we pursue Wisdom using the multiple-frame model of pursuing Wisdom, we seek problems that ring true with the pursuit of all boundless factors of pursuing Wisdom, which are timeless ends. We also seek to solve these problems using models that help us predict what will happen. Hence, the set of rules for pursuing Wisdom using the multiple-frame model of pursuing Wisdom contains both the rules of dialectics and the rules of logic. We may call this set of rules the *rules of Reason*.[4]"

"[4] Students of Western thought may better understand the distinction between logic, dialectics, and Reason by studying Ludwig Wittgenstein's conversion from a picture theory of language, which he based on an explicitly temporal view of the world, to an instrumental theory of language, which he based on everyday thinking. As a result of this conversion, Wittgenstein came to believe that the goal of understanding language was to show the fly the way out of the fly-bottle. In contrast to this biological goal, the public goal of understanding language is to help people pursue Wisdom, hence the Good, the Truth, Justice, Beauty, and all of the other boundless factors of pursuing Wisdom. These students may find the decision-oriented interpretation of quantum mechanics useful in thinking through the problems of existence and consciousness, e.g., whether a carp that glows in the dark can be said to exist if it only exists in the mind of genetic scientist who knows how to make fish that glow in the dark. They may discover that quantum mechanics makes more sense than modern common sense."

Chapter 8, Natural Reasoning, third paragraph

Changed "Given cosmological periods of time, even" to "Even" in the last sentence.

Changes in Version 2011.05.02

Acknowledgments, fifth paragraph

Changed "computer language" to "language" in the last sentence.

Preface, first four paragraphs

"*Boundless Pragmatism* is the book that I wish I had read thirty-two years ago for George Leland Bach's course, "Business, Government, and the Changing Environment." Dean Bach intended his pioneering course in ethical decision-making to be the high point of our Stanford MBA experience. From the first day until the last, he relentlessly questioned our solutions to case studies without disclosing his values. It was only after we finished the last case that he told us three rules that he used to test his decisions. These were (1) the golden rule (*Do unto others as you would have them do unto you*); (2) the television rule (*Assume that your actions will become widely known*); and (3) the long-run rule (*Don't eat your seed corn*).

"I wanted something more coherent and complete than these three decision rules. I had learned many analytical tools in business school. I knew that these tools could lead me astray. I wanted something to help me know when I was in danger of being led astray. I have since learned that I ought to have wanted a *science of deciding well*, by which I mean a method of weeding out members of the set of descriptions of the world that we use to guide our actions.

"Some modern thinkers will claim that I confuse seeking the truth with seeking wisdom. In making this claim, they confuse the temporal problem of seeking the truth and the temporal problem of seeking wisdom with the timeless problem of seeking both the truth and wisdom. In doing so, they confirm Albert Einstein's observation, "Perfection of means and confusion of ends seem to characterize our age." This confusion arises from a deeply-ingrained cultural bias toward pursuing what we currently want rather than pursuing what we need in order to decide well. This temporal bias tends to blind us to making the best use of what we currently know.

"To help us overcome this temporal bias, I propose a simple model of deciding well: Deciding well is a matter of repeatedly applying a sequence of decision-making steps such that the results of one cycle becomes the basis of the next cycle. The essential steps in this recursive process are (1) choosing a temporal problem to solve; (2) attempting to solve this problem well; and (3) learning from the experience. Deciding well, so conceived, is an economic process, which is to say that it is a public process subject to constraints. These constraints concern not only solving temporal problems, but also learning how to solve temporal problems ever better."

were changed to:

"In the fall quarter of 1978, I took George Leland Bach's MBA course in ethics. From the first day until the last, Dean Bach relentlessly questioned our solutions to cases without disclosing his values. It was only after we finished the last case that he told us three rules that he used to judge his solutions. These were (1) the golden rule (*Do unto others as you would*

have them do unto you); (2) the television rule (*Assume that your actions will become widely known*); and (3) the long-run rule (*Don't eat your seed corn*). I wanted something more coherent and complete than these three rules. I wanted something to help me know when analytical tools were leading me astray. I have since learned that I ought to have wanted a *science of deciding well*, by which I mean a method of weeding out descriptions of the world that we use to guide our actions.

"Some modern thinkers will claim that I confuse seeking the truth with seeking wisdom. In claiming this, they confuse the temporal with the timeless. In doing so, they fail to make the best use of what they currently know. To correct this mistake, I propose a timeless model of deciding well:

Deciding well is a matter of repeatedly applying a sequence of decision-making steps such that the results of one cycle become the basis of the next cycle. The basic steps in this recursive process are (1) choosing a temporal problem to solve; (2) attempting to solve this problem well; and (3) learning from the experience.

Deciding well, so conceived, is an economic process, a process subject to constraints. These constraints concern not only solving temporal problems, but also learning how to solve temporal problems ever better."

Preface, new third paragraph

Changed "concept" to "model" in the first sentence.

Changed "an explanation" to "a formal explanation" in the fourth sentence.

Preface, new third paragraph

Changed "universal, boundless factor" to "boundless factor" in the second sentence.

Preface, new fourth through sixth paragraphs

"Students of Western thought may find in this intertwined pursuit a synthesis of the Platonic pursuit of knowledge of ideal forms and the Aristotelian pursuit of knowledge of natural forms. Like the Platonic pursuit, the pursuit of the timeless end of deciding well involves pursuing knowledge of ideal forms. Unlike the Platonic pursuit, this pursuit is endless. We can never see the whole truth by the light of all that is good. Like the Aristotelian pursuit, the pursuit of the timeless end of deciding well involves replicable patterns of reasoning. Unlike the Aristotelian pursuit, this pursuit involves not only rules that bind beliefs together into coherent models of the world, but also rules for binding these models together into a coherent whole. The source of the coherence for binding these models together is the symmetry of pursuing the timeless end of deciding well. The form of reasoning that underlies this intertwined pursuit is neither dialectical nor logical, but rather a synthesis of dialectical and logical reasoning.

"From the timeless view of deciding well put forth in this work, the essential pursuit of the timeless end of deciding well has translational symmetry with respect to reference frames defined by beliefs and circumstances. When we expand the scope of the problems we face to the limits of imagination, our problems become part of the problem that contains all other problems. The solution to this universal problem, which is the essential process of pursuing the timeless end of deciding well, is the same for all of us. In mathematical terms, the essential pursuit of the timeless end of deciding well is *invariant* with respect to reference frames defined by beliefs and circumstances. As such, it is something that we discover rather than invent.

"In this little book, I have tried to provide people with the intellectual tools they need to discover and use the essential process of pursuing the timeless end of deciding well. In the first chapter, I explain why making the most of what we know in pursuing the timeless end of living well calls for us to pursue the timeless end of deciding well. In the remaining chapters, I describe timeless conceptual frameworks useful in pursuing the timeless end of deciding well."

were changed to:

"Students of Western thought may find in this timeless pursuit a synthesis of the Platonic pursuit of ideal forms and the Aristotelian pursuit of natural forms. Like the Platonic pursuit, this pursuit involves pursuing knowledge of ideal forms. Unlike the Platonic pursuit, it is endless. We shall never see the whole truth by the light of all that is good. Like the Aristotelian pursuit, this pursuit involves replicable patterns of reasoning. Unlike the Aristotelian pursuit, it involves not only rules that bind beliefs together into coherent models of the world, but also rules for binding these models together into a coherent whole. The source of the coherence for binding these models together is the symmetry of deciding well.

"In this little book, I have tried to provide people with the tools they need to discover and use this basic process of deciding well. In the first chapter, I explain why making the most of what we know calls for us to decide well. In the remaining chapters, I describe timeless conceptual frameworks useful in deciding well."

Preface, new sixth paragraph

Changed "invariant complements" to "timeless complements" in the first sentence.

Changed "information age equivalent of Adam Smith's" to "timeless equivalent of the modern" in the last sentence.

Preface, new seventh paragraph

Changed "pursuing the timeless end of deciding well" to "deciding well" in the first sentence.

Preface, new eighth and ninth paragraphs

"In "Believing Well," I describe the process of refining everyday thinking. This includes invariant alternatives to the modern concepts of the natural sciences, the social sciences, and the humanities. Next I describe the process of refining the process of deciding well. This includes explanations of why the modern economic concept of equilibrium leads us to underestimate the probability of great turbulence and why seeking to extend good times by lowering the quality of decisions is as shortsighted as seeking to prevent all forest fires. I end the chapter with some brief reminders about pursuing the timeless end of believing well.

"In "Governing Ourselves Well," I argue that it is useful to think of governments as timeless experiments that test the stories that we use to assign rights and responsibilities. I go on to argue that the best such story is the one that calls for us to pursue the timeless end of living well ever more wisely. I end the chapter with a brief explanation of the differences between invariant, modern American, and classical liberalism."

were changed to:

"In "Believing Well," I explain how we can refine everyday thinking. I then explain how we can refine deciding well. In doing so, I explain why modern economics leads us to underestimate the probability of great turbulence and why seeking to extend good times by lowering the quality of decisions is as shortsighted as seeking to prevent all forest fires.

"In "Governing Ourselves Well," I argue that it is useful to think of governments as timeless experiments that test the stories that we use to assign rights and responsibilities. I go on to argue that the best such story is the one that calls for us to decide well. I end by describing three distinct types of liberalism."

Preface, new tenth paragraph

Changed "Einstein's claims" to "Albert Einstein's twin claims" in the last sentence.

Preface, new eleventh paragraph

Changed "go on to" to "then" in the last sentence.

Preface, last two paragraphs

"In the last chapter, "Reasoning Well," I relate boundless pragmatism to dialectical philosophy, analytical philosophy, and fractal geometry.

"My hope in writing such a short book is that people will read it more than once, and that on each reading they will understand ever more of their own experiences in a better way."

were changed to:

"In the last chapter, "Reasoning Well," I argue that the reasoning that underlies deciding well is neither dialectical nor logical, but rather a synthesis of both.

"My hope in writing such a short book is that people will read it more than once, and that on each reading they will better understand their lives."

Chapter 1, *A Pragmatic Model of Deciding Well*, first paragraph

Changed "each" to "the" in the fourth sentence.

Chapter 4, *Two Forms of Ignorance*, second paragraph

"At the largest problem-scale level, which we may call *the transcendent level*, there is nothing left to learn, hence no need for either models that help us predict or models that help us explain."

was changed to:

"At the largest problem-scale level there is nothing left to learn, hence no need for models that help us predict or explain."

Chapter 6, The Farther Reaches of our Nature, last paragraph

Changed "Maslow" to "He" in the last sentence.

Chapter 6, *The Worldly Benefits of Detachment*, first paragraph

Deleted ", which is its ability to promote reverence for life" from the first sentence.

Chapter 6, *Einstein's Twin Warnings*, last paragraph

Changed ""the way, and the truth, and the life" in terms of the multiple-frame model of pursuing Wisdom," to "Jesus as the way, and the truth, and the life," in the fifth from the last sentence.

Changes in Version 2011.05.07

Chapter 1, Temporal versus Invariant Values, last paragraph

Changed "our original problem pursuing Wisdom" to "our original problem" in the first sentence.

Chapter 1, *A Pragmatic Model of Pursuing Wisdom*, title

Changed title to: "*Steps for Building Multiple-Frame Models*."

Chapter 1, *Steps for Building Multiple-Frame Models*, first paragraph, first sentence

"We can use this insight into the relation between pursuing the Truth and pursuing Wisdom as the basis for a model of pursuing Wisdom."

was moved to the end of the last paragraph of the preceding section and changed to:

"We can use this insight as the basis for building multiple-frame models of pursuing Wisdom."

Chapter 1, *Steps for Building Multiple-Frame Models*, first paragraph

"Building this model calls for repeating three basic steps. The first is discovering a member of the set of factors of pursuing Wisdom that we can never have in excess. The second is building a useful frame for pursuing the boundless factor by defining it and the means to it in terms of one another. The third is recognizing that Wisdom is a boundless factor of this boundless factor of pursuing Wisdom."

was changed to:

"We can build ever more complete models of pursuing Wisdom by repeating three basic steps. The first step is discovering a member of the set of factors of pursuing Wisdom that we can never have in excess. The second is building a useful frame for pursuing the boundless factor by defining it and the means to it in terms of one another. The third is recognizing that Wisdom is a boundless factor of this boundless factor of pursuing Wisdom. In theory, each cycle through these steps yields a better model of pursuing Wisdom. In practice, these models can be too complete. In terms of modern economics, the marginal costs of using more complete models can outweigh the marginal benefits of using these models. In terms of modern physics, classical mechanics is often good enough."

Chapter 1, *Ever More Complete Models of Pursuing Wisdom*, title

Changed title to: "*Ever More Complete Multiple-Frame Models*."

Chapter 1, *Ever More Complete Models of Pursuing Wisdom*, last paragraph

"The most obvious benefit of this multiple-frame model of pursuing Wisdom is that it allows us to use more of what we know about the world than any single-frame model of the world does. This is true whether we use it to deliberate, to form and judge decision-rules, or to form and judge habits. A less obvious benefit is that it provides us with a more robust means of creating knowledge through failure. In this, it is like the Toyota production system. However, unlike the Toyota production system, it is universally useful."

were changed to:

"The most obvious benefit of this multiple-frame approach is that it allows us to use more of what we know about the world than any single-frame approach does. This is true whether we use it to deliberate, to form and judge decision-rules, or to form and judge habits. A less obvious benefit is that it provides us with a more robust means of creating knowledge through failure."

Chapter 3, Pursuing the Ring of Truth, all paragraphs

"There is an ancient belief that equates truth with beauty. Nineteenth-century poet John Keats expressed this belief in the closing lines of his poem, "Ode on a Grecian Urn":

"Beauty is truth, truth beauty, — that is all ye know on earth, and all ye need to know."[1]

Combining this ancient belief with the invariant concepts of pleasure and joy yields an invariant concept of beauty: *beauty is the quality of objects whose contemplation yields not only pleasure but also the joy that comes from improving how well our beliefs fit together into a coherent whole that is useful in pursuing Wisdom*.

"To give us pleasure, an activity must not be too easy or too hard. Too easy an activity bores us; too hard an activity overwhelms us. When the activity is contemplation, the object of contemplation must not be too simple or too hard to contemplate. Contemplating too simple an object bores us; contemplating too hard an object overwhelms us. Between what is boring and what is overwhelming is a level of difficulty that allows us to lose ourselves in contemplation. As we learn more, objects that once were too hard may bring us pleasure; and objects that once brought us pleasure may become boring. Learning about the structure of classical music may turn Beethoven's symphonies from being overwhelming to being beautiful. It may also turn pop music from being beautiful to being boring.

"To give us joy, an activity must improve our state of being. When the activity is contemplation, the object of contemplation must be just novel enough for us to learn from it. If the object is not novel or too novel we will not learn from it. As we learn more, objects that once brought us joy become mundane and objects that were once too novel become beautiful. Before we learn calculus, Newton's theory of gravity is too novel to bring us joy. After we learn calculus, it has the potential to bring us joy. With use, it becomes just another tool.

"From the view of the multiple-frame model of pursuing Wisdom, pursuing the Truth calls for us to pursue all of the boundless factors of pursuing Wisdom. This is a benefit, not a burden. It provides us with a more certain way of testing problems before we attempt to solve them. If a problem is consistent with all of our beliefs about the boundless factors of pursuing Wisdom, then it rings true. We have found a beautiful problem to solve."

were changed to:

"Pursuing Wisdom using the multiple-frame model of pursuing Wisdom calls for us to contemplate how well the problems we find ring true with all that we currently know about pursuing Wisdom. If a problem rings true, then we have found a beautiful problem to solve.

Accordingly, we define the timeless frame for pursuing Beauty by defining contemplating well and the timeless end of contemplating well in terms of one another. By itself, this timeless frame is useless. However, we can make it useful in pursuing Wisdom by making it part of the multiple-frame model of pursuing Wisdom.

"Consider how we can use this timeless frame and the invariant concepts of pleasure and joy to define a concept of beauty that is useful in pursuing Wisdom. To yield pleasure, an activity must not be too easy or too hard. Too easy an activity bores us; too hard an activity overwhelms us. When the activity is contemplating, the object we contemplate must not be too simple or too hard to contemplate. Contemplating too simple an object bores us; contemplating too hard an object overwhelms us. Between these two extremes is a level of difficulty that allows us to lose ourselves in contemplating. As we learn more, objects that once were too hard may yield pleasure; and objects that once yielded pleasure may become boring. Learning about classical music may turn Beethoven's symphonies from being overwhelming to being beautiful. Learning may also change simpler music from being beautiful to being boring.

"To yield joy, an activity must improve our state of being. When the activity is contemplating, the object we contemplate must be able to improve our state of being. Within the context of the multiple-frame of pursuing Wisdom, the object we contemplate must be able to improve how well our beliefs fit together into a coherent whole that we find useful in pursuing Wisdom. For us to be able to learn something useful in pursuing Wisdom from it, it must be just novel enough for us to be able to learn from it. If it is too familiar or too novel, we will not be able to learn from it. As we learn more, objects that once were too novel may become just novel enough to yield joy and objects that were just novel enough may become too familiar to yield joy. Before we learn calculus, Newton's theory of gravity is too novel to yield joy. After we learn calculus, it may yield joy. With use, it becomes just another tool for living well.

"In summary, by putting the timeless frame of pursuing Beauty into the multiple-frame model of pursuing Wisdom, we learn that beauty is the quality of objects whose contemplation yields not only the pleasure that comes from losing ourselves in contemplating, but also the joy that comes from contemplating well. Beauty is the quality of objects whose contemplation yields not only pleasure, but also the joy of becoming wiser."

Chapter 3, Leaving Behind Modern Explanations, all paragraphs

"Pursuing Wisdom calls for us to choose among a nearly infinite number of nearly infinite paths forward. Thinking deeply about these paths calls for us to leave behind modern models for explaining the world. In doing so, we become as sailors venturing beyond landfall. Fortunately, we can use the linguistic equivalent of transcendental recursive numbers to help us navigate these potentially maddening seas.

"Transcendental recursive numbers are transcendental in that we cannot reduce them to algebraic expressions. In this sense, we can never know them completely. They are recursive in that they are the solution of at least one endlessly repeating cycle of steps in which the

result of one cycle becomes the basis for the next cycle. The mathematical constant π is a transcendental recursive number. It is transcendental in that we cannot reduce it to an algebraic expression. It is a recursive in that we can theoretically know it by means of at least one endlessly repeating cycle of steps in which the result of one cycle becomes the basis for the next cycle.

"We can imagine a set of transcendental recursive objects. These objects are transcendental in that we cannot reduce them to logical expressions. In this sense, we can never know them completely. They are recursive in that we can theoretically know them by means of at least one endlessly repeating cycle of steps in which the result of one cycle becomes the basis for the next cycle. Wisdom is a transcendental recursive object. Wisdom is transcendental in that we cannot reduce it to logical expressions. It is recursive in that we can theoretically know it by means of at least one endlessly repeating cycle of steps in which the result of one cycle becomes the basis for the next cycle.

"We may think of the processes by which we come to know ever more about recursive numbers or objects as having three elements. The first of these elements is the process itself. In pursuing π, this process is any one of many means of computing π. In pursuing Wisdom, this process is deciding well.

"The second of these elements is the transcendental end of the process. This end is complete knowledge of the recursive number or object. In computing π, the transcendental end is the ratio of the circumference of a Euclidean circle to its diameter. The form of this end is a number. In deciding well, the transcendental end is the knowledge that allows a perfectly wise being to decide perfectly well. The form of this end is the form of knowledge that is most useful to a perfectly wise being in deciding well.

"The third of these elements is the timeless end of the process. The timeless end is that which we seek during the process. In computing π, the timeless end is ever better approximations of π. The form of this end is a number. In deciding well, the timeless end is ever better approximations of Wisdom. The form of this end is a set of incomplete descriptions of the world. These descriptions ought to be as simple as possible, but not simpler; and the set of descriptions ought to be as small as possible, but not smaller.[2]"

were changed to:

"Pursuing Wisdom calls for us to choose among a nearly infinite number of nearly infinite paths. Thinking deeply about this problem calls for us to leave behind modern models for explaining the world. We can use the concept of *transcendental recursive objects* to help us muddle forward ever more wisely.

"Recursive objects are objects that we know better by means of a repeating cycle of steps in which the result of one cycle becomes the basis for the next cycle. We may think of these recursive processes as having three basic parts. The first is the cycle of steps that we apply repeatedly; the second is the result of each cycle; and the third is the result of the process.

"Consider the problem of dividing a bag of marbles equally among six children. We can solve this simple problem using a simple recursive process. The steps in this process are removing six marbles from the bag; giving each child a marble; and repeating the first two steps until there are less than six marbles in the bag. In this simple example, the result of each cycle is the number of marbles each child has received, and the result of the process is the number of marbles each child will receive.

"Complete knowledge of some recursive objects will always transcend our knowledge of them. The best we can do is to find a recursive process that will yield ever better approximations of these transcendent recursive objects. The mathematical constant π is one such object. We can define π exactly (as the ratio of the circumference to the diameter of a Euclidean circle), but can never know it completely. In mathematical terms, we can never reduce this number to an algebraic expression. Wisdom is another such object. We can define Wisdom exactly (as knowledge that allows a being to decide perfectly), but we can never know it completely. In terms of this work, we can never reduce this object to a logical expression, to any set of logically related beliefs about the world.

"The recursive process for knowing transcendent objects is endless. Hence, we may reasonably call the result of a cycle its *timeless end* and the result of the process its *transcendent end*. In computing π, the timeless and transcendent ends are both numbers. In pursuing Wisdom, the timeless end is ever better approximation of Wisdom and the transcendental end is complete knowledge of Wisdom. The form of the timeless end is a set of incomplete descriptions of the world. These descriptions ought to be as simple as possible, but not simpler; and the set of descriptions ought to be as small as possible, but not smaller. The form of the transcendental end is the most useful form for a perfectly wise being in deciding well.[2]"

Chapter 3, Leaving Behind Modern Explanations, last paragraph, last sentence, footnote

Moved the reference from the first sentence to the last.

Chapter 3, *Three Approaches to Overcoming Constraints*, title

Changed title to: "*Three Approaches to Policy*."

Chapter 3, *Three Approaches to Policy*, all paragraphs

"Pursuing Wisdom calls for us to choose problems well, which in turn calls for us to think beautifully. The concept of thinking beautifully will likely seem strange to most modern readers. This is in part due to the modern habit of confusing mental models with reality. We saw this in the EOQ example, in which modern managers confused the EOQ model with reality. We can also see it in the claim that we can compute π.

"From the view of mathematics, π is *computable*, which is to say that we can program a Turing machine, an abstract computing machine that does nothing more than follow programmed rules, to compute π. In contrast, from the view of the multiple-frame model of

pursuing Wisdom, π is not computable. The false claim that π is computable arises from reducing the actual problem of computing π to an abstract problem of computing π. As we shall see throughout this work, the tendency of people who excel at abstract reasoning to ignore worldly constraints is common.

"Imagine giving the greatest scientific minds of 1776 the task of computing the value of π to one trillion (10^{12}) decimal places. The most likely result would be a description of the best tool for computing π in 1776 and the explanation that computing π to one trillion decimal places was possible in theory but impossible in practice. No one in 1776 imagined what we currently call supercomputers.[3]

"Now imagine giving the greatest scientific minds of today the task of computing π to one googol (10^{100}) decimal places. Based on how they respond to this challenge, these people will likely fall into one of two basic groups. The first group will report how computing π to one googol decimal places might be done using currently existing or imagined computing tools. Because this approach relies on currently existing or imagined tools to pursue our chosen ends, we may call it *the temporal approach to overcoming constraints*. The second group will report that it is currently impossible to imagine what computing tools will first make computing π to one googol decimal places possible. Over time, people competing for scarce resources will invent ever better means of computing. Because this approach relies on endless competition to produce the tools we need to pursue our chosen ends, we may call this *the timeless approach to overcoming constraints*.[4]

"From the view of the multiple-frame model of pursuing Wisdom, there is a third group. This group will report that the best means of computing π to one googol decimal places is to pursue Wisdom, hence to pursue the virtuous circle of good people and good products. Over time, pursuing this virtuous circle will yield computing tools capable of computing π to far beyond one trillion decimal places. We may call this *the invariant approach to overcoming constraints*."

were changed to:

"From the view of mathematics, π is *computable*, which is to say that we can program an abstract computing machine that does nothing more than follow programmed rules to compute π. In contrast, from the view of the multiple-frame model of pursuing Wisdom, π is not computable. The false claim that π is computable arises from reducing the actual problem of computing π to an abstract problem of computing π that ignores constraints. If wishes were horses beggars would ride. The following thought experiment explains how three distinct approaches to overcoming constraints give rise to three distinct approaches to policy.

"Imagine giving the greatest minds of 1776 the task of computing the value of π to a trillion decimal (10^{12}) places.[3] Most of these people would likely provide what they believed to be the best means of computing π. Because this approach relies on currently existing means of overcoming constraints, we may call this *the temporal approach to overcoming constraints*. From this view, we ought to promote solutions that use existing tools. We may call this the *engineering approach to policy*.

"Now imagine giving the greatest minds of today the task of computing π to a googol (10^{100}) decimal places. Some of these people would likely provide what they believe to be the best means of computing π. Others would likely say that people seeking to live well will invent ever better means of computing and that we cannot imagine what better means they will invent. Because this approach relies on the timeless process of living well, we may call this *the timeless approach to overcoming constraints*.[4] From this view, we ought to promote the timeless end of living well and leave the problem of overcoming constraints to people to work out among themselves. We may call this the *biological approach to policy*.

"From the view of the multiple-frame model of pursuing Wisdom, there is a third approach to overcoming constraints. People taking this approach would say that the best means of computing π to a googol decimal places is to pursue Wisdom. We may call this *the invariant approach to overcoming constraints*. This approach suggests that we ought to promote the invariant end of deciding well and leave the problem of overcoming constraints to people to work out among themselves. From this view, we ought to promote pursuing Wisdom using the multiple-frame model of pursuing Wisdom and leave the problem of overcoming constraints to people to work out among themselves. We may call this the *public approach to policy*."

Chapter 3, *Public Order*, first three paragraphs

"These three approaches to overcoming constraints suggest three distinct approaches to policymaking. The temporal approach to overcoming constraints suggests that policymakers ought to promote solutions to problems that use currently existing or imagined tools. From this view, excellence in means concerns *efficiency at solving given problems*. We may call this the *engineering approach to policymaking*.

"The timeless approach to overcoming constraints suggests that policymakers ought to promote the modern economic goal of living well and leave the problem of overcoming constraints to the marketplace of ideas. From this view, excellence in means concerns *fitness for an ever changing environment created by people acting like social animals*. We may call this the *biological approach to policymaking*.

"The invariant approach to overcoming constraints suggests that policymakers ought to promote the invariant process of deciding well and leave the problem of overcoming constraints to the marketplace of ideas. From this view, excellence in means concerns *fitness for an ever changing environment created by people deciding ever more wisely*. We may call this the *public approach to policymaking*."

were deleted.

Chapter 3, *Invariant Public Order*

Merged this subsection into the *Public Order* subsection.

Chapter 8, heading, first quote

""Philosophy, as I shall understand the word, is something intermediate between theology and science. Like theology, it consists of speculations on matters as to which definite knowledge has, so far, been unascertainable; but like science, it appeals to human reason rather than to authority, whether that of tradition or that of revelation. All *definite* knowledge — so I should contend — belongs to science; all *dogma* as to what surpasses definite knowledge belongs to theology. But between theology and science there is a No Man's Land, exposed to attack from both sides; this No Man's Land is philosophy." — *Bertrand Russell*[1]"

"[1] Russell, Bertrand, *A History of Western Philosophy* (New York: Simon and Schuster, 1967), p. xiii."

was changed to:

"1 The world is everything that is the case. ...
2 What is the case, the fact, is the existence of atomic facts. ...
7 Whereof one cannot speak, thereof one must be silent." — *Ludwig Wittgenstein*[1]"

"[1] Wittgenstein, Ludwig *Tractatus Logico-Philosophicus* (New York, Cosimo Classics, 2010), principal propositions 1, 2, and 7. This is the C. K. Ogden translation, which is also available online at Project Gutenberg <http://www.gutenberg.org/ebooks/5740> (7 May 2011)."

Chapter 8, Useful Reasoning, first paragraph, last two sentences

"We may call excellence in relating beliefs *reason*. We may also call the rules that we use to help us relate beliefs well the *rules of reason*."

was changed to:

"We may call excellence in relating beliefs *reason* and the rules that we use to help us relate beliefs well the *rules of reason*."

Chapter 8, Useful Reasoning, second paragraph

"When we pursue timeless ends, we seek not only to seek to solve given temporal problems, but also to find problems to solve. Excellence in relating beliefs concerns not only relating beliefs within the frames that we use to solve temporal problems, but also in relating beliefs within the frames that we use to find problems to solve. We may call the set of rules that we use to relate beliefs within the frames that we use to find problems to solve in pursuing timeless ends the *rules of dialectics* after the dialectic form of discourse that Socrates used to explain what timeless ends and the means to timeless ends are not."

was changed to:

"When we pursue timeless ends, we seek not only to solve given problems, but also to find problems to solve. Excellence in relating beliefs concerns not only the frames we use to solve

given problems, but also those we use to find problems to solve. We may call the set of rules that we use to judge the latter the *rules of dialectics* after the dialectic form of discourse that Socrates used to explain what timeless ends are not."

Chapter 8, Useful Reasoning, fourth paragraph

Changed "temporal" to "given" in the first sentence.

Chapter 8, Useful Reasoning, fifth paragraph

Changed "contemplating" to "addressing" in the last sentence.

Chapter 8, Useful Reasoning, last paragraph, footnote, last sentence

"They may discover that quantum mechanics makes more sense than modern common sense."

was deleted.

Changes in Version 2011.05.10

Chapter 2, *Pleasure and Pain*, second paragraph

Changed "logic" to "reasoning" in the last sentence.

Chapter 2, *Pleasure and Pain*, sixth paragraph

Changed "logic" to "reasoning" in the last sentence.

Chapter 3, *Public Order*, last three paragraphs

"Associated with each of these three ways of thinking about policymaking is a distinct way of thinking about public order. From the engineering view, the role of policymakers is to find and solve public problems. The way policymakers define the problem and its solution provides them with a concept of order. In addressing their chosen problem and solution, policymakers impose their sense of order on the world. Hence, increasing public order is always good.

"From the biological view, the role of policymakers is to promote an environment that helps people find and solve problems that hinder them from increasing their ability to survive and thrive. Here, public order concerns the freedom of people to act on their current beliefs about how best to survive and thrive. Either too much or too little public order shuts down the experimentation needed to increase fitness. Hence, increasing public order is good when there is too little of it and bad when there is too much of it.

"From the public view, the role of policymakers is to promote an environment that helps people pursue Wisdom. This gives rise to a timeless concept of public order, which we may call *invariant public order*. Pursuing invariant public order is always good."

were changed to:

"Associated with each of these three ways of thinking about policy is a distinct way of thinking about public order. From the engineering view, policymakers find and solve public problems. In doing so, they seek to impose their sense of order on the world. From this view, increasing public order is always good.

"From the biological view, policymakers promote a climate that helps people live well. This includes allowing people to experiment with new ways of living well. Too much or too little public order shuts down this experimentation. From this view, increasing public order is good when there is too little of it and bad when there is too much of it.

"From the public view, policymakers promote a climate that helps people pursue Wisdom. This gives rise to an invariant concept of public order that concerns how well people decide. Increasing *invariant* public order is always good."

Chapter 3, *Decision-Oriented Models of Quantum Mechanics*, third paragraph

Changed "logic" to "reasoning" in the second to last sentence.

Chapter 8, Useful Reasoning, first paragraph

Changed "Again, pursuing" to "Pursuing" in the first sentence.

Chapter 8, Useful Reasoning, second paragraph

Changed "problem that is bounded in time" to "temporal problem" in the second sentence.

Chapter 8, Useful Reasoning, fourth paragraph, last sentence

"The least ambiguous means of defining these two concepts is to define each in terms of the other."

was deleted.

Chapter 8, Useful Reasoning, fifth paragraph

"Unlike logic, dialectics reminds us of our fallibility. Given our incomplete knowledge of how to decide well in pursuing timeless ends, we make mistakes. In terms of this work, we embed mistakes into our networks of knowledge-in-use. Knowledge of our fallibility in pursuing timeless ends encourages us to examine the tools we use to guide our actions.[3] However, when we combine this knowledge with the belief that there are experts who know

more than we do about how we ought to live, we tend to give too much power to experts. In addressing our fallibility, we ought to follow the personal example of Socrates, not the politics of Plato."

"[3] In terms of nineteenth-century German idealism, the internal contradictions of the models we use to guide our actions build up to a crisis that leads us to change our beliefs."

was deleted.

Chapter 8, Natural Reasoning, all paragraphs

"The multiple-frame model of pursuing Wisdom is something that we discover, not something we invent. It emerges from the combination of the inexhaustibility of knowledge and the internal drive for all living things to seek to survive and thrive. In seeking to make the best use of knowledge, living beings learn to cooperate with one another.

"From the view of modern biology, living beings cooperate well in order to compete well. In other words, pursuing the timeless end of cooperating well is subordinate to pursuing the timeless end of competing well. From this view, people who seek to cooperate before they seek to compete, to look first for win-win solutions to resource problems before they seek to compete over resources, are an anomaly.

"In contrast, from the view of the multiple-frame model of pursuing Wisdom, living beings compete well in order to cooperate well, in order to make the best use of knowledge resources in living well. In other words, pursuing the timeless end of competing well is superior to pursuing the timeless end of competing well. Only when living beings lack the means to cooperate do they compete. Living beings that seek to compete before they seek to cooperate are the special case of living beings that have not yet developed the means to pursue Wisdom using the multiple-frame model of pursuing Wisdom. Even the lowest form of life may evolve into a form capable of understanding the multiple-frame model of pursuing Wisdom.

"Which of these two views of the relation between cooperating well and competing well is the better view for helping us find problems to solve, hence for explaining the world? In theory, the multiple-frame model is more complete, hence better than the biological model at helping us find problems to solve. In practice, the multiple-frame model, which has us seek win-win solutions before choosing to compete, is also better than the biological model at helping us find problems to solve.

"People who seek empirical evidence supporting one or the other of these theories would be wise to study the power law distributions of the products of economic activity. These include the distributions of wealth and income studied by Vilfredo Pareto and the distribution of changes in commodity prices studied by Benoit Mandelbrot. Such distributions are the result of some self-similar process or processes. From the view of modern biology, it is not clear what this process or these processes might be. From the view of the multiple-frame model of pursuing Wisdom, it is clear that this process is pursuing Wisdom."

were changed to:

"From the view of modern biology, living beings cooperate well in order to compete well. Those that seek to cooperate before they seek to compete, to look first for win-win solutions to resource problems before they seek to compete over resources, are an anomaly. In contrast, from the view of the multiple-frame model of pursuing Wisdom, living beings compete well in order to cooperate well. They seek to cooperate well in order to make the best use knowledge in living well. Only when they lack the means to cooperate well do they compete. Living beings that seek to compete before they seek to cooperate are the special case of beings that have not yet developed the wisdom to do otherwise. Which of these views is the better view for helping us find problems to solve, hence for explaining the world?

"People who seek evidence supporting one or the other of these views would do well to study power-law distributions in economies.[5] These distributions are the result of some self-similar process or processes. From the view of modern biology, it is not clear what this process or these processes might be. From the view of the multiple-frame model of pursuing Wisdom, it is clear that this process is pursuing Wisdom."

"[5] These power-law distributions include the distributions of wealth and income studied by Vilfredo Pareto and the distribution of changes in commodity prices studied by Benoit Mandelbrot."

Changes in Version 2011.05.16

Preface, second paragraph, second sentence

"As we shall see, these people confuse the temporal with the timeless. In doing so, they fail to make the best use of what they currently know."

were changed to:

"These people confuse the temporal ends of seeking the truth and pursuing wisdom with the timeless end of seeking the truth and wisdom."

Preface, fifth paragraph

Changed "basic process" to "basic model" in the first sentence.

Preface, sixth paragraph

Changed "go on to describe" to "end" and "equivalent" to "analogue" in the last sentence.

Preface, seventh paragraph

Changed "decision-oriented" to "decision-tree" in the last sentence.

Chapter 1, Useful Frames, last paragraph

Changed "decide" to "muddle forward" in the second to last sentence.

Chapter 1, *The EOQ/RTS Example*, second paragraph

Changed "tools" to "the tool" in the last sentence.

Chapter 1, *The EOQ/RTS Example*, last paragraph, footnote

Changed "Appendix A" to "the appendix" in the last sentence.

Chapter 1, *Basic Steps for Building Multiple-Frame Models*, first paragraph

"We can build ever more complete models of pursuing Wisdom by repeating three basic steps. The first step is discovering a member of the set of factors of pursuing Wisdom that we can never have in excess. The second is building a useful frame for pursuing the boundless factor by defining it and the means to it in terms of one another. The third is recognizing that Wisdom is a boundless factor of this boundless factor of pursuing Wisdom. In theory, each cycle through these steps yields a better model of pursuing Wisdom. In practice, these models can be too complete. In terms of modern economics, the marginal costs of using more complete models can outweigh the marginal benefits of using these models. In terms of modern physics, classical mechanics is often good enough."

was changed to:

"We can build models of pursuing Wisdom that are ever more complete by repeating two basic steps. The first step is discovering a member of the set of universal factors of pursuing Wisdom that we can never have in excess. The second is building a useful frame for pursuing this boundless factor by defining it and the means to it in terms of one another."

Chapter 1, *Basic Steps for Building Multiple-Frame Models*, second paragraph, last sentence

"We complete this simple model by recognizing that Wisdom is a boundless factor of pursuing Wisdom."

was deleted.

Chapter 1, *Basic Steps for Building Multiple-Frame Models*, third paragraph, last sentence

"We then recognize that Wisdom is a boundless factor of pursuing the Truth."

was deleted.

Chapter 1, *Ever More Complete Multiple-Frame Models*, first two paragraphs

Merged the first two paragraphs.

Chapter 1, *Ever More Complete Multiple-Frame Models*, new second paragraph, footnote

Second sentence:

"From the invariant view of deciding well, the incompleteness of Quine's epistemology gave rise to both Jaegwon Kim's criticism of Quine's epistemology for not having a normative element and Morton White's argument with Quine over the scope of holistic pragmatism."

was changed to:

"The incompleteness of Quine's epistemology gave rise to both Jaegwon Kim's criticism of Quine's epistemology for not having a normative element and Morton White's argument with Quine over the scope of holistic pragmatism."

Moved footnote to the end of the last paragraph.

Chapter 1, *Ever More Complete Multiple-Frame Models*, second to last paragraph

Added the footnote:

"[13] In theory, each new frame we add to the multiple-frame model of pursuing Wisdom yields a better model for pursuing Wisdom. In practice, the marginal costs of using models that are more complete can outweigh the marginal benefits of using these models. Just as classical mechanics is often a good enough tool for helping us solve problems, a multiple-frame model of pursuing Wisdom that includes the Good, the Truth, Justice, and Beauty is often a good enough tool for helping us find problems to solve."

Chapter 2, *Pleasure and Pain*, first paragraph

Changed "Pleasure and pain can be seen" to "We can conceive of pleasure and pain" in the first sentence.

Deleted the footnote: "[2] This may include the absence of mental signals. For example, the absence of signals that our brain interprets as pain when we should feel pain signals us that our nervous system is not working properly."

Chapter 2, *Pleasure and Pain*, second paragraph, first sentence

"Two sorts of pleasure concern us here."

was changed to:

"We can also conceive of two basic types of pleasure."

Chapter 2, Wealth, first paragraph

Changed "can be known" to "we can ever know" in the third sentence.

Chapter 2, *Chicago Screwdrivers*, first paragraph

Changed "temporal tools that are not also invariant tools" to "variant tools" in the second sentence.

Chapter 2, Production, first paragraph

Changed "; hence" to ", thus" in the second and fourth sentences (2 occurrences).

Chapter 2, Profit, first paragraph

Changed "what is left over from" to "what remains of" in the first sentence.

Changed "simply the return" to "the return" in the last sentence.

Chapter 3, Public Order, fourth through last paragraphs

"Imagine a team cycling race in which we measure excellence by the average time it takes team members to complete a two hundred kilometer course. During this event, team members can interact only with one another and not with members of other teams. How should team members choose to order themselves?

"Imagine how a team taking an engineering approach to policymaking would approach the problem of ordering themselves in this situation. The first task would be to reduce the ill-defined problem to a problem or set of problems that members of the team can solve. The simplest solution would be to choose a single public order for all conditions expected along the course. A refinement to this solution would be to choose different public orders for different conditions. There might be an order for traveling over flat terrain, another for traveling up hills, and a third for traveling down hills. Another refinement would be to develop procedures for rotating cyclists from more tiring positions to less tiring positions as they become tired within a given type of order. Yet another refinement would be to develop procedures for rotating cyclists from more tiring positions to less tiring positions when the team shifts between types of order. Over time, the team would refine their ability to maintain orders and to shift between these orders. To an outside observer, an accomplished team taking this approach would resemble an expert military drill team.

"Imagine how a team taking a biological approach to policymaking would approach the problem of ordering themselves in this situation. Team members would develop relatively simple rules for overcoming constraints. Over time, they would learn ever better rules for

overcoming constraints. To an outside observer, an accomplished team taking this approach would resemble a school of fish or a flock of birds.

"Finally, imagine how a team taking the public approach to policymaking would approach the problem of ordering themselves in this situation. Team members would distinguish between the tactical end of cycling well based on what they currently know and the strategic end of deciding well. In addressing the tactical problem, they would choose to make the best use of current resources in addressing the tactical problem of cycling well. In addressing the strategic problem, they would seek ever better means of replacing non-knowledge resources useful in deciding well with knowledge resources useful in deciding well. In short, they would seek ever better means of deciding well.

"In seeking ever better means of deciding well, the team would consider technological as well as organizational changes. One such change would be the combination of regenerative braking and boosting motors. This combination would allow cyclists to store otherwise wasted energy from cycling downhill to use when cycling uphill. Another such change would be a networked steering control system similar to experimental automated highway control systems that allow cars to travel bumper-to-bumper at high speeds. Such a system would execute tactical moves much more quickly and precisely than people can execute them. The combination of regenerative breaking, boosting motors, and automated steering would quickly lead to the development of a means of transferring power from one vehicle to another. This change would eliminate the need to rotate team members from tiring positions to less tiring positions. It would also allow the team to reduce wind resistance by putting cyclists who ride taller than others near the center of the pack. To a long-standing outside observer, an accomplished team taking the public approach to overcoming constraints would resemble a liquid that undergoes phase changes as it becomes ever more fluid."

were changed to:

"We can use the example of a cycling race to imagine the results of each of these types of public order. Imagine a team time trial in which we measure excellence by the average time it takes team members to complete a two hundred kilometer course. During this event, team members can interact only with one another and not with members of other teams.

"A team taking an engineering approach would approach the problem of ordering themselves. Their first task would be to reduce problem of ordering themselves to a set of problems that they can address using what they currently know. The simplest solution would be to choose a single public order for all conditions along the course. A refinement would be to choose different public orders for different conditions. There might be an order for moving over flat terrain, another for moving up hills, and a third for moving down hills. Another refinement would be to develop procedures for rotating cyclists from more tiring positions to less tiring positions as they become tired. Over time, the team would refine their ability to maintain orders and to shift between these orders. An accomplished team taking this approach would resemble an expert military drill team.

"A team taking a biological approach would invent rules for overcoming constraints. For example, they would develop rules for drafting behind one another. Over time, they would invent ever better rules for governing their behavior. An accomplished team taking this approach would resemble a school of fish or a flock of birds.

"A team taking the public approach would distinguish between the tactical end of cycling well based on what they currently know and the strategic end of deciding well. In addressing the tactical problem, the team would choose to make the best use of current resources in addressing the problem of cycling well. In the short run, an accomplished team taking this approach would resemble teams taking engineering or biological approaches.

"In addressing the strategic problem, the team would seek ever better means of replacing non-knowledge resources useful in deciding well with knowledge resources useful in deciding well. Hence, it would consider technological as well as organizational changes. One such change would be the combination of regenerative braking and boosting motors. This combination would allow cyclists to store otherwise wasted energy from cycling downhill to use when cycling uphill. Another such change would be a networked steering control system similar to experimental automated highway control systems that allow cars to travel bumper-to-bumper at high speeds. Such a system would execute tactical moves much more quickly and precisely than people can execute them. The combination of regenerative breaking, boosting motors, and automated steering would quickly lead to the development of a means of transferring power from one vehicle to another. This change would eliminate the need to rotate team members from tiring positions to less tiring positions. It would also allow the team to reduce wind resistance by putting cyclists who ride taller than others near the center of the pack. In the long run, an accomplished team taking the public approach would resemble a liquid that undergoes phase changes as it becomes ever more fluid."

Chapter 3, *Zero Public Entropy*, first two paragraphs

"Liquids that undergo phase changes as they become ever more fluid lie outside of our everyday experience. A dramatic example of such a liquid is that of the isotope of helium that has two neutrons and two electrons (helium-4). Helium-4 atoms are objects subject to quantum effects having integer spin, which physicists call bosons. Unlike objects subject to quantum effects having non-integer spin, which physicists call fermions, more than one boson can occupy the same quantum state. Statistically, this is unlikely to happen unless bosons enter their lowest energy state, which physicists call their *ground state*. As the temperature approaches absolute zero (0 degrees Kelvin), an ever larger number of ^{4}He atoms enter their ground state. At 2.172 degrees Kelvin, a large enough percentage of helium-4 atoms enter this state for the liquid to suddenly change from being only slightly more fluid than classical physics predicts to being much more fluid than classical physics predicts. In other words, liquid helium suddenly changes from being a fluid (Helium I) to a superfluid (Helium II).

"One lesson that we can learn from studying liquids like helium-4 is the usefulness of the concept of entropy in pursuing transcendental ends. Entropy is a measure of the amount of potentially available useful resources in an object. In modern thermodynamics, entropy is a

measure of the potentially useful energy resources in a part of the world. We pursue the transcendental end of *zero thermodynamic entropy* by removing useful energy from a part of the world. In invariant decision science, entropy is a measure of the potentially available non-knowledge resources useful in deciding well in a process of deciding well. We pursue the transcendental end of *zero public entropy* by removing available non-knowledge resources useful in deciding well from a process of deciding well, thereby inducing the creation of knowledge resources useful in deciding well.[5]"

"[5] Zero public entropy is the transcendental end of the process of inducing the creation of knowledge useful in deciding well. It is the space-time equivalent of the state-of-the-world in which it is not possible to make one person better off without making another person worse off (Pareto optimality). From the view of a person behind the veil of complete ignorance, it is the ideal process of deciding well. For more on the process of inducing the creation of knowledge, see Appendix A."

were changed to:

"Liquids that undergo phase changes as they become ever more fluid lie outside of our everyday experience. A dramatic example of such a liquid is that of the isotope of helium that has two neutrons and two electrons (^{4}He). These atoms are bosons (objects that have integer spin). Unlike fermions (objects that have non-integer spin), more than one boson can occupy the same quantum state. Statistically, this is unlikely to happen unless bosons enter their ground state (lowest energy state). As we remove more energy from these bosons, more of them enter their ground state. At just below 2.2 degrees Kelvin and one atmosphere of pressure, a large enough percentage of them enter their ground state for this liquid to change from being only slightly more fluid than classical physics predicts (Helium I) to being much more fluid than classical physics predicts (Helium II). In short, it changes from being a fluid to a superfluid.

"Superfluid ^{4}He atoms interact with each other too much for all of them to enter their ground state. However, other types of bosons do not have this problem. For example, the bosonic form of rubidium enters a state of matter in which all atoms are in their ground state at 170 billionths of a degree above absolute zero. In this state, which physicists call a Bose Einstein condensate, groups of atoms act as if they were a single quantum particle. In this state, we can observe quantum effects on a macroscopic level.

"One lesson that we can learn from studying how liquids become superfluid is the usefulness of the concept of entropy. Entropy is a measure of the amount of potentially useful resources in an object. Modern scientists first used this concept to think about engines that derive useful work from differences in heat. In this context, entropy is a measure of the amount of useful energy that it is theoretically possible to remove from an object. They later used this concept to think about the amount of useful information in an object. In this context, entropy is a measure of the amount of signal that is theoretically possible to remove from an object. We may use this concept to think about useful resources in decision processes. In this context, entropy is a measure of the amount of wealth that it is theoretically possible to remove from a decision process. We may call this measure *public entropy*. We pursue the

transcendental end of *zero public entropy* by removing *non-knowledge* wealth from a decision process, thereby inducing the creation of knowledge wealth.[5]"

"Zero public entropy is the transcendental end of the process of inducing the creation of knowledge useful in deciding well. It is the dynamic alternative to Pareto optimality.[6] From the view of a person behind the veil of complete ignorance, it is the ideal process of deciding well."

"[5] For more on the process of inducing the creation of knowledge, see the appendix."

"[6] Pareto optimality is the state of the world in which it is impossible to make any person better off without making at least one other person worse off."

Chapter 3, *Zero Public Entropy*, last two paragraphs

"We can use the concept of zero public entropy to help us find problems to solve. As we saw in the EOQ example, the concepts we use to frame our problems tend to blind us to finding better problems to solve. In the team cycling example above, one such blinder is the association of "cycling" with "bicycling." This association tends to blind us to possibilities for substituting knowledge for non-knowledge resources in ways that would violate our concept of bicycling. These possibilities include regenerative breaking, boosting motors, and automated steering. A strategy based on lowering public entropy, a strategy of removing ever more non-knowledge resources useful in deciding well from the endless process of deciding well, would reveal this problem."

"A more subtle blinder in the team cycling example is the false belief that we can separate the problem of cycling well from the problem of deciding well. For a team of cyclists to take a truly public approach to overcoming constraints, its solution to the problem of cycling well must be part of the solution to the problem of deciding well. For this to be true, being part of the team must be something every team member needs to do in order to decide well rather than simply something every team member wants to do. Again, a strategy based on lowering public entropy, a strategy of removing ever more non-knowledge resources useful in deciding well from the process of deciding well, would reveal this problem. Here, we see how lowering public entropy creates a problem whose solution does not fit within the bounds of our chosen problem of cycling well. In general, lowering public entropy reveals not only problems whose solutions fall within the bounds of our chosen problem, but also problems whose solutions surpass the bounds of our chosen problem, thereby overturning the belief system that led us to choose the problem we chose. We may call the problems whose solutions fall within the bounds of our chosen timeless problem as we currently understand it *normal problems* and those that surpass the bounds of our chosen timeless problem as we currently understand it *revolutionary problems*."

were changed to:

"We can use the concept of zero public entropy to help us find problems to solve. As we saw in the EOQ example, the concepts we use to frame our problems tend to blind us to finding

better problems to solve. In the cycling example above, one such blinder is the way we associate "cycling" with "bicycling." This tends to blind us to ways of replacing knowledge wealth for non-knowledge wealth. These include regenerative breaking, boosting motors, and automated steering. A strategy based on lowering public entropy would reveal this problem.

"A more subtle blinder is the false belief that we can separate one decision process from all others. For a team of cyclists to take a truly public approach to overcoming constraints, its solution to cycling well must be part of the solution to deciding well. Hence, being part of the team must be something that every team member needs to decide well. In general, lowering public entropy reveals not only problems with solutions that fall within the bounds of chosen problems, but also those that surpass these bounds. We may call the former *normal problems* and the latter *revolutionary problems*."

Chapter 3, *Decision-Oriented Interpretations of Quantum Mechanics*, first three paragraphs

"Another lesson that we can learn from studying liquids like helium-4 is that we can use the knowledge of what happens as we approach such natural boundaries as absolute zero temperature to help us understand subtle changes that happen far from these natural boundaries. By studying what happens in extreme cases, we can gain a deeper understanding of our everyday world. By studying what happens as we approach the transcendental end of absolute zero temperature, we may refine our beliefs about how what happens at the microscopic level of quantum mechanics affects what happens on the macroscopic level of what we currently call the natural sciences. Similarly, by studying what happens as we approach the transcendental end of absolute zero public entropy, we may refine our beliefs about how what happens on the microscopic level of quantum mechanics affects what happens on the macroscopic level of decision science.

"Although quantum mechanical models provide us with incredibly accurate *statistical* predictions about what will happen on the microscopic level, it does not provide us with exact predictions about what will happen on this level. This uncertainty is due to two strange behaviors of objects on this level. First, these objects can act either like waves or like particles. Second, pairs of these objects may become entangled in such a way that changing the state of one object instantaneously changes the state of the other object regardless of how distant the other object is. Rigorous empirical testing over many decades has failed to disprove the existence of these two strange behaviors.

"For more than seven decades physicists have been trying to interpret the mathematical models of quantum mechanics in ways that ring true with what they believe they know about causation on the macroscopic level. Most of these interpretations fall into one of three basic categories. The first of these basic categories contains interpretations that claim we should not waste resources trying to explain how objects at this level behave. We may call this the *Copenhagen interpretation* category. The second of these categories contains interpretations that claim that in time we will be able to find currently hidden variables that explain how objects at this level behave. We may call this the *hidden-variables interpretation* category. The third of these categories contains interpretations that claim that every possible way that an object can transition irreversibly from acting like a wave to acting like a particle actually

happens. When one of these irreversible events happens, the world[6] splits into a world in which the event occurs and into another world in which the event does not occur. Following this logic, everything that could possibly have happened since the beginning of time has actually happened. We may call this the *many worlds interpretation* category."

were changed to:

"Another lesson that we can learn from studying how liquids become superfluid is the usefulness of studying extreme cases. By studying what happens as we approach absolute zero, we may refine our beliefs about how quantum mechanics relates to everyday life.

"Quantum mechanics provides us with statistical rather than exact predictions about what will happen on the microscopic level. This shortcoming is due to two strange behaviors of objects on this level. First, when objects on this level interact with one another, they act like particles; but when they do not interact with one another, they act like waves. Second, entangled pairs of these objects defy our common sense beliefs about cause and effect. Regardless of how far away the two objects in an entangled pair are from one another, changing the state of one instantaneously changes the state of the other. Decades of experiments have failed to disprove the existence of these two strange behaviors.

"For as many decades as physicists have known of these strange behaviors, they have been trying to explain them in a way that rings true with what else they believe they know. Most of these explanations fall into one of three basic categories. The first of these contains explanations that claim we should not waste resources trying to explain how quantum-level objects behave. We may call this the *Copenhagen interpretation* category. The second contains explanations that claim that we will be able to find hidden variables that explain how these objects behave. We may call this the *hidden-variables interpretation* category. The third contains explanations that claim that every time one of these objects irreversibly transitions from acting as a wave to acting as a particle, the world[6] splits into a world in which the transition occurs and into another world in which it does not occur. Following this logic, everything that could have happened since the beginning of time has actually happened. We may call this the *many worlds interpretation* category."

Chapter 3, *Decision-Oriented Interpretations of Quantum Mechanics*, last three paragraphs

"From the view of the multiple-frame model of pursuing Wisdom, there is a fourth way we can interpret the quantum mechanics. It involves creating a new way of thinking about how we collectively decide well. If all people pursue Wisdom, and do so well, we can treat all people as if they were a single decider. This allows us to use a decision tree model[7] to relate quantum mechanics to everyday thinking.[8] In this model the world consists of (1) a sequence of once current states-of-the-world, (2) a current state-of-the-world, and (3) a nearly infinite set of currently possible states-of-the-world. In short, the world consists of a past, a present, and a nearly infinite number of possible futures. Every time a quantum object irreversibly transitions from acting like a wave to acting like a particle, the current state-of-the-world changes and a nearly infinite number of possible states-of-the-world cease to be possible

states-of-the-world. We may call this forward-looking, boundlessly-pragmatic approach to interpreting quantum mechanics *the decision tree interpretation*.

"From the view of modern physics, the decision tree interpretation of quantum mechanics appears to ignore such things as constraints on deciding well imposed by relativity theory and information theory. In contrast, from the invariant view of decision science, this interpretation hides details about the world as we currently understand it inside the decision model. This is consistent with the purpose of these models, which is to help us find and solve problems in pursuing Wisdom."

"Consider the problem of whether to invest in a research program that has a goal of overcoming the constraint of communicating at greater than light speed. From the view of modern physics, communicating at greater than light speed is impossible; hence investing in a research program to discover a way of communicating at greater than light speed would be foolish. From the view of what we currently call the natural sciences, communicating at greater than light speed does not ring true with what else we currently know about physics; hence investing in such a research program would likely be foolish. From the view of decision science, the net present value of the benefits of communicating at greater than light speed are currently likely to be small compared to the net present value of the cost of the research program; hence investing in such a research program would likely be foolish. From the view of the multiple-frame model of pursuing Wisdom, the most beautiful solution to the problem of whether to invest in this research program is the decision science solution."

were changed to:

"From the public view, there is a fourth category. In it, the world consists of a past, a present, and a nearly infinite number of possible futures. Every time a quantum-level object irreversibly transitions from acting as a wave to acting as a particle, the current state-of-the-world changes and a nearly infinite number of possible states-of-the-world cease to be possible states-of-the-world. We may call this *the decision interpretation* category.

"***A Decision-Tree Interpretation of Quantum Mechanics***
One member of this new category is a model in which we assume that there are no constraints on gathering and using information. Information flows as freely as it does in the modern economic model of perfect competition. In this ideal model, people pursue Wisdom using the multiple-frame model of pursuing Wisdom. Hence, markets tend toward the dynamic equilibrium of zero public entropy rather than the static equilibrium of Pareto optimality. When people pursue Wisdom, markets tend toward Justice.

"In this ideal model, all information, including wisdom, flows freely. What modern economists view as consuming is producing pleasure, joy, and wisdom.

"In this ideal model, people decide perfectly. In deciding perfectly, all people act as if they were a single decider facing a single problem, which is the public problem that contains all other problems.

"We may think of this model as a single decision-tree[7] in which events are either under the control of people pursuing Wisdom or not under the control of people pursuing Wisdom.[8] This is compatible with the decision interpretation of quantum mechanics.

"From the view of modern physics, this decision-tree interpretation of quantum mechanics appears to ignore constraints on deciding well imposed by relativity theory and information theory. In contrast, from the invariant view of decision science, this interpretation hides details about the world inside the decision model. This is consistent with the purpose of these models, which is to help us find and solve problems in pursuing Wisdom."

"Consider the problem of whether to invest in a research program that has the goal of overcoming the constraint of communicating at greater than light speed. From the view of modern physics, communicating at greater than light speed is impossible; hence investing in a research program to discover a way of communicating at greater than light speed would be foolish. From the view of what we currently call the natural sciences, communicating at greater than light speed does not ring true with what else we currently know about physics; hence investing in such a research program would likely be foolish. From the view of decision science, the net present value of the benefits of communicating at greater than light speed are likely to be small compared to the net present value of the cost of the research program; hence investing in such a research program would likely be foolish *at this time*. From the view of the multiple-frame model of pursuing Wisdom, the most beautiful solution to the problem of whether to invest in this research program is the decision science solution."

Chapter 4, Refining Deciding Well, fourth paragraph

Changed "civil research program" to "public research program" in the first sentence.

Chapter 5, Liberalism, second paragraph

Changed "timeless liberal view" to "view of the multiple-frame model of pursuing Wisdom" in the second sentence.

Chapter 6, *Schweitzer's Universal Spiritual Need*, first paragraph

Changed "It is this need that Maslow's fully human Westerners seek to satisfy" to "Maslow's fully human Westerners seek to satisfy this need" in the second sentence.

Chapter 6, *Schweitzer's Universal Spiritual Need*, second paragraph, first sentence

"Schweitzer saw two means of satisfying the need for mystical oneness, *ethical* and *magical mysticism*."

was changed to:

"Schweitzer saw two means of satisfying the need for mystical oneness. These are *ethical* and *magical mysticism*."

Chapter 6, *Heroic Death*, last paragraph

Changed ", or do we learn" to "or" in the second sentence.

Chapter 8, Useful Reasoning, fourth paragraph

Changed "possibility of finding better means for finding problems to solve" to "room for better visions within the current frame" in the last sentence.

Chapter 8, Useful Reasoning, last paragraph, footnote

"Students of Western thought may better understand the distinction between logic, dialectics, and Reason by studying Ludwig Wittgenstein's conversion from a picture theory of language, which he based on an explicitly temporal view of the world, to an instrumental theory of language, which he based on everyday thinking. As a result of this conversion, Wittgenstein came to believe that the goal of understanding language was to show the fly the way out of the fly-bottle. In contrast to this biological goal, the public goal of understanding language is to help people pursue Wisdom, hence the Good, the Truth, Justice, Beauty, and all of the other boundless factors of pursuing Wisdom. These students may find the decision-oriented interpretation of quantum mechanics to be useful in thinking through the problems of existence and consciousness, e.g., whether a carp that glows in the dark can be said to exist if it only exists in the mind of a genetic scientist who knows how to make fish that glow in the dark."

were changed to:

"Students of Western thought may better understand the distinction between logic, dialectics, and Reason by studying Ludwig Wittgenstein's conversion from a picture theory of language, which he based on an explicitly temporal view of the world, to an instrumental theory of language, which he based on everyday thinking. Wittgenstein came to believe that the goal of understanding language was to help people live good lives. In his words, it was to "show the fly the way out of the fly-bottle." In contrast to this biological goal, the public goal of understanding language is to help people pursue Wisdom. These students may find decision-oriented interpretations of quantum mechanics to be useful in thinking through the problems of existence and consciousness, e.g., whether a carp that glows in the dark can be said to exist if it only exists in the mind of a geneticist who knows how to make fish that glow in the dark."

Changes in Version 2011.05.26

Preface, fourth paragraph

Changed "this pursuit" to "it" in the second and fifth sentences (2 occurrences).

Preface, sixth paragraph

Changed "decide well" to "decide well using this model" in the second sentence.

Changed "conceptual frameworks useful in deciding well" to "universal factors of deciding well that we can never have in excess" in the last sentence.

Preface, second to last paragraph, end

Added the sentence:

"I go on to argue that this form of reasoning is the general case. It only appears to be a special case to people who are locked into a temporal view of the world."

Chapter 1, Setting Words Aright, fourth paragraph, second footnote

"[3] Kuhn, Thomas, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1962), chapter 10."

was changed to:

"[3] Bruner, J. S. and Postman, L. "On the Perception of Incongruity: A Paradigm," Journal of Personality, XVIII (1949), 206-23."

Chapter 1, Ever More Complete Multiple-Frame Models, second paragraph

Changed "pursuing Wisdom well" to "pursuing Wisdom" in the first sentence.

Chapter 1, Ever More Complete Multiple-Frame Models, sixth paragraph, footnote

Changed "the Good" to "only the Good" in the last sentence.

Chapter 2, Consumption, first paragraph

Changed "Hence" to "Thus" in the second and fourth sentences (2 occurrences).

Chapter 3, Leaving Behind Modern Explanations, fourth paragraph, last sentence

Changed "logical expression, to any set of logically related beliefs about the world" to "logical expression" in the last sentence.

Chapter 3, *Public Order*, fourth paragraph

Changed "team members" to "twelve team members" in the second sentence.

Added the following sentence: "Cycles must have two wheels, cannot have a seat closer to the ground than the top of the largest wheel, cannot have windscreens of any type, and cannot exceed three meters in length."

Chapter 3, *Zero Public Entropy*, second paragraph, last sentence

"In this state, we can observe quantum effects on a macroscopic level."

was deleted.

Chapter 3, *Zero Public Entropy*, third paragraph, footnote, end

Added the sentences:

"Note that public entropy varies inversely with physical entropy. Such is life."

Chapter 3, *Zero Public Entropy*, last paragraph

Changed "Hence" to "Thus" in the third sentence.

Chapter 4, *Two Types of Ignorance*, second paragraph

Changed "hence" to "thus" in the second sentence.

Chapter 4, *Two Types of Ignorance*, last paragraph

Changed "hence" to "thus" in the all (3 occurrences).

Chapter 4, Refining Everyday Thinking, last paragraph, footnote, end

Added the sentences to the online version. (This change was overlooked in the PDF version):

"On a deeper level, 'reflexive' implies that our thoughts about the world are not part of the world. This is consistent with the atomistic thinking of Ludwig Wittgenstein. In contrast, 'recursive' implies that our thoughts about the world are part of the world. This is consistent with the decision-tree interpretation of quantum mechanics. For more on this, read the last chapter."

Chapter 4, Useful Reminders, second paragraph

Changed "this boundlessly-pragmatic approach to believing well" to "pursuing the Truth" in the first sentence.

Changed "reminds" to "tells" in the second and third sentences (2 occurrences).

Chapter 6, *Worldly Benefits of Detachment*, second paragraph

Changed "The classic of this" to "A classic example" in the last sentence.

Chapter 6, *Worldly Benefits of Detachment*, last paragraph

Changed "; it" to ". It" in the last sentence.

Chapter 6, A Common Timeless End, first paragraph

Changed "pursuing Wisdom well" to "pursuing Wisdom" in the last sentence.

Chapter 7, second paragraph

"From a temporal view of deciding well, what we currently believe is always good, hence winning others over to what we currently believe is always good. In contrast, from the view of the multiple-frame model of pursuing Wisdom, what we currently believe is not always what we need to believe in order to pursue Wisdom, hence winning others over to what we currently believe is only good if what we currently believe is what we need to believe in order to pursue Wisdom. Further, pursuing the timeless end of competing well calls not only for winning only those battles in which we are on the right side, but also for winning over people who do not share these beliefs in the way that is most conducive to pursuing Wisdom. Supreme excellence consists not only in being on the right side, but also in breaking the enemy's resistance without fighting. The surest means of achieving this end is to pursue Wisdom deliberately."

was deleted.

Chapter 7, The Scope of Reason, entire section

"**The Scope of Reason**
Pursuing ends well calls for us to overcome our ignorance of the world. This ignorance takes the form of uncertain predictions and incomplete explanations of causation. Uncertain predictions hinder us from solving problems well. Incomplete explanations hinder us from finding the best problems to solve. Models of the world that we use to predict and explain relate beliefs about the world in ways that are useful in predicting and explaining the world. We may call excellence in relating beliefs *reason*.

"As we saw in the first chapter of this book, it is reasonable for us to use the concept of symmetry to help us find problems to solve in pursuing Wisdom. The more beautiful a problem appears to us, the more likely it is a good problem to solve.

"From the modern view of game theory, the invariant approach to finding problems to solve is irrational. In contrast, from the view of the multiple-frame model of pursuing Wisdom, the modern approach to game theory is irrational. This disagreement arises from differing concepts of reason. From the modern view of game theory, reason is a matter of following the rules of logic. In contrast, from the view of the multiple-frame model of pursuing Wisdom, reason is a matter of not only following the rules of logic, but also the rules of

symmetry. We can see this difference in the problem that modern cognitive scientist Douglas Hofstadter used to introduce what he called *superrationality* to readers of his Scientific American column, *Metamagical Themas*.[2]

"Hofstadter sent a registered letter out to twenty people asking them to play a one-time Prisoner's Dilemma game against each other. In each game, if both players cooperated each would receive $3; if both defected each would receive $1; and if one defected and the other cooperated, the defector would receive $5 and the cooperator would receive $0. Hofstadter told them that this was a one-time game and that, in his opinion, each player was equally bright. He asked them not to try to discuss this game with anyone, especially with other people who they thought might be other players. He also gave them several scenarios to make sure that they understood the game. He told them that if everyone cooperated, everyone would receive $57 (19 x $3). If everyone defected, everyone would receive $19 (19 x $1). If eleven people cooperate and nine people defect; then the cooperators will each get $30 (10 x $3 + 9 x $0) and the 9 defectors will each get $63 (11 x $5 + 8 x $1). He told them that defectors would always receive at least as much money as everyone else (hence would never be a "loser"), but that they should aim at getting as much money as possible rather than to be a "winner." He also told them that the ideal situation for any one player would be to be the single defector, in which case he or she would make $95 (19 x $5) and the others would each make $54 (18 x $3 + 1 x $0). Finally, he asked each player to tell him by telephone whether they wished to cooperate (C) or defect (D), and to explain why they chose as they did.[3]

"From the modern view, the better solution to this game is to defect. The reason is that regardless of what the opposing player does, the deciding player is better off by defecting. If the opposing player defects, cooperating yields nothing and defecting yields $1. If the opposing player cooperates, cooperating yields $3 and defecting yields $5. In contrast, Hofstadter suggests that all players consider the symmetry of the game as a whole before they settle on a strategy. Considering the game as a whole, each player can see that all players face the same problem and so should seek the same solution, which is the solution that provides the best payoff to each player. Again, if everyone cooperates, each player would get $57; and if everyone defects, each player would get $19. Hence, the better solution is to cooperate.

"The actual results of Hofstadter's experiment in game theory were that six people chose to cooperate and fourteen chose to defect. Both groups received less than the $57 each would have received had all chosen to cooperate. The six cooperators each received $15 (5 x $3 + 14 x $0) and the fourteen defectors each received $43 (6 x $5 + 13 x $1). This result led Hofstadter to speculate that somewhere in the universe there are societies in which people compete by considering the symmetry of the whole before choosing a strategy. These "superrational" societies would tend to do better than "rational" societies.[4]

"The players' reactions to the game were as interesting as the results themselves. An expert in modern game theory saw no reason to cooperate. A biologist was so sure that no one would cooperate that he began his phone call by announcing "Okay, Hofstadter, give me the $19." A physicist reported that he wanted to cooperate, but said that he couldn't find any way of justifying it. Another player became so frustrated that he ended up flipping a coin to

determine whether to cooperate or defect.[5] These reactions are typical of how people react to perceptual and cognitive dissonance. Nearly thirty years on, the conceptual problem underlying this dissonance has remained unresolved.

"From the view of the multiple-frame model of pursuing Wisdom, this dissonance is the result of using modern game theory to explain what people will do. We may use modern game theory to help us predict what social animals will do. However, we ought never to use modern game theory to help us explain what people do. To do so would be to prescribe that people ought to act like social animals rather than wise people.

"Consider the reaction of the former author of the Scientific American *Mathematical Games* column, Martin Gardner, to Hofstadter's game:

> "Horrible dilemma. I really don't know what to do about it. If I wanted to maximize my money, I would choose to D and expect that others would also; to maximize satisfaction, I'd choose C, and hope other people would do the same (by the Kantian imperative). I don't know, though, how one should behave *rationally*. You get into endless regresses: 'If they all do X, then I should do Y, but then they'll anticipate that and do Z, and so...' You get trapped in an endless whirlpool."[6]

"Gardner recognized that the problem players face in Hofstadter's game is how best to frame the problem. From the view of the multiple-frame model of pursuing Wisdom, we best frame this problem by making the problem of framing this problem part of the problem we are trying to solve. This creates an endless loop: How do we choose the best frame? We choose the frame that best helps us decide well. How do we choose the best frame for choosing the best frame? We choose the frame that best helps us decide well. How do we choose the best frame for choosing the best frame for choosing the best frame? We choose the frame that best helps us decide well... Regardless of how many times we cycle through this endless loop, the answer is always that we choose the frame that best helps us decide well. From a purely logical view, this gets us nowhere. Each time we cycle through the loop, we end up back at our starting point. However, from the view of the multiple-frame model of pursuing Wisdom, each time we cycle through this loop, we expand the scope of the problem we are seeking to solve. This is consistent with Dwight Eisenhower's maxim, "If a problem cannot be solved, enlarge it." Taking this advice to its logical limit, we end with the problem that contains all other problems. We best address this universal problem by pursuing Wisdom. Within Hofstadter's game, we best pursue this timeless end by choosing the more beautiful temporal problem to solve, which is the temporal problem that calls for us to cooperate well. This temporal problem has us act like wise people rather than social animals.

"From the view of the multiple-frame model of pursuing Wisdom, Hofstadter discovered an anomaly in modern game theory as a tool for helping us find problems to solve, but did not put forth a viable alternative to modern game theory as a tool for helping us find problems to solve: He showed us a procedure that changes us from acting like social animals to acting like wise people. However, he did so using language that discouraged us from using this procedure.[7] He told players to aim at getting the most money. He might instead have told

them to act in their own best interest. He told players that they were all equally bright. He might instead have told them that they were equally wise, hence equally good, true, and just. He emphasized the one-time nature of the game. He might instead have emphasized how current choices foreclose paths forward. In explaining what he had discovered, he distinguished between "rational" defectors and "superrational" cooperators.[8] He might instead have distinguished between "incoherent" defectors and "rational" cooperators. He might have changed the concept of excellence in thinking, which we commonly call "rationality," from a concept based on logic to one based on both logic and the symmetry of pursuing Wisdom using the multiple-frame model of pursuing Wisdom.

"The concept of excellence in thinking is one of the most important concepts in our belief systems. Changing the meaning of this key concept calls for us to restructure our entire belief system. People will tend to make these changes when they expect the benefits of making them to exceed the costs of making them. The expected benefit of making these changes increases with the size of the problem on which we base our expectations. In contrast, the expected cost of making these changes remains the same regardless of the size of the problem on which we choose to base our expectations. Hence, the larger the scope of the problem on which we base our expectations, the more likely we are to make these changes. For example, if we base our expectations on the problem that contains all other problems, we will likely make these changes; but if we base our expectations on Hofstadter's one-time game, we will likely not make them.[9]"

"[2] *Metamagical Themas* is an anagram of *Mathematical Games*, the title of the Scientific American column Martin Gardner wrote from 1956 through 1980. Hofstadter wrote this column from January 1981 until July 1983. Many of these columns expand on themes he originally put forth in his book, *Gödel,Escher, Bach, An Eternal Golden Braid*."

"[3] Hofstadter, Douglas *Metamagical Themas, Questing for the Essence of Mind and Pattern* (New York: Basic Books 1985), pp. 740–1."

"[4] Ibid., p. 764."

"[5] Ibid., pp. 742–3."

"[6] Ibid."

"[7] Ibid."

"[8] Ibid., pp.739-55."

"[9] This is not to say that people make such calculations before they change their belief systems. It is only to say that they tend to act as if they do."

were changed to:

"**The Scope of Game Theory**

Nearly thirty years ago, cognitive scientist Douglas Hofstadter[2] sent a registered letter out to twenty experts asking them to play a one-time game against each other. In each game, if both players cooperated, each would receive $3; if both defected, each would receive $1; and if one defected and the other cooperated, the defector would receive $5 and the cooperator would receive $0. Hofstadter told them that this was a one-time game and that, in his opinion, each player was equally bright. He asked them not to try to discuss this game with anyone, especially with other people who they thought might be other players. He also gave them several scenarios to make sure that they understood the game. He told them that if everyone cooperated, everyone would receive $57 (19 x $3). If everyone defected, everyone would receive $19 (19 x $1). If eleven people cooperate and nine people defect; then the cooperators will each get $30 (10 x $3 + 9 x $0) and the defectors will each get $63 (11 x $5 + 8 x $1). He told them that defectors would always receive at least as much money as everyone else (hence would never be a "loser"), but that they should aim at getting as much money as possible rather than to be a "winner." He also told them that the ideal situation for any one player would be to be the single defector, in which case he or she would make $95 (19 x $5) and the others would each make $54 (18 x $3 + 1 x $0). Finally, he asked each player to tell him by telephone whether and why they wished to cooperate (C) or defect (D).

"From the view of modern game theory, the better solution to this game is to defect. The reason is that regardless of what the opposing player does, the deciding player is better off by defecting. If the opposing player defects, cooperating yields nothing and defecting yields $1. If the opposing player cooperates, cooperating yields $3 and defecting yields $5. In contrast, Hofstadter suggested that all players consider the symmetry of the game as a whole before they settle on a strategy. Considering the game as a whole, each player can see that all players face the same problem and so should seek the same solution, which is the solution that provides the best payoff to each player. Again, if every player cooperates, each would get $57, and if every player defects, each would get $19. Hence, the better solution is to cooperate.

"The results of this experiment were six people chose to cooperate and fourteen chose to defect. The cooperators each received $15 (5 x $3 + 14 x $0) and the defectors each received $43 (6 x $5 + 13 x $1). Both groups received less than the $57 each would have received had all players chosen to cooperate.[3]

"The players' reactions to the game were as interesting as the results themselves. An expert in modern game theory saw no reason to cooperate. A biologist was so sure that no one would cooperate that he began his phone call by announcing "Okay, Hofstadter, give me the $19." A physicist reported that he wanted to cooperate, but said that he could not find any way of justifying it. Another player became so frustrated that he ended up flipping a coin to determine whether to cooperate or defect.[4] The former author of the *Scientific American* Mathematical Games column, Martin Gardner, recognized that Hofstadter's game did not fit into modern game theory categories, but this knowledge did not help him decide how to decide rationally:

"Horrible dilemma. I really don't know what to do about it. If I wanted to maximize my money, I would choose to D and expect that others would also; to maximize satisfaction, I'd choose C, and hope other people would do the same (by the Kantian imperative). I don't know, though, how one should behave *rationally*. You get into endless regresses: 'If they all do X, then I should do Y, but then they'll anticipate that and do Z, and so...' You get trapped in an endless whirlpool."[5]

"***A Classic Anomaly***

Students of philosopher of science Thomas Kuhn may recognize these reactions as typical responses to stimuli that do not fit current theoretical models. In his most famous work, *The Structure of Scientific Revolutions*, Kuhn compared these responses to the reactions of subjects in a 1949 experiment in cognition.[6] In this experiment, psychologists Jerome Bruner and Leo Postman told their subjects that they were going to test how quickly people could identify playing cards. Unknown to their subjects, some of these cards had the color of the suit reversed. They began flashing these cards quickly, but gradually increased the exposure time. They ended each run after a subject successfully identified two cards in a row. Kuhn wrote of this experiment:

"Even on the shortest exposures many subjects identified most of the cards, and after a small increase all the subjects identified them all. For the normal cards these identifications were usually correct, but the anomalous cards were almost always identified, without apparent hesitation or puzzlement, as normal. The black four of hearts might, for example, be identified as the four of either spades or hearts. Without any awareness of trouble, it was immediately fitted to one of the conceptual categories prepared by prior experience. One would not even like to say that the subjects had seen something different from what they identified. With a further increase of exposure to the anomalous cards, subjects did begin to hesitate and to display awareness of an anomaly. Exposed, for example, to the red six of spades, some would say: That's the six of spades, but there's something wrong with it — the black has a red border. Further increase of exposure resulted in still more hesitation and confusion until finally, and sometimes quite suddenly, most subjects would produce the correct identification without hesitation. Moreover, after doing this with two or three of the anomalous cards, they would have little further difficulty with the others. A few subjects, however, were never able to make the requisite adjustment of their categories. Even at forty times the average exposure required to recognize normal cards for what they were, more than 10 percent of the anomalous cards were not correctly identified. And the subjects who then failed often experienced acute personal distress. One of them exclaimed: 'I can't make the suit out, whatever it is. It didn't even look like a card that time. I don't know what color it is now or whether it's a spade or a heart. I'm not even sure now what a spade looks like. My God!'"[7]

"To understand why these expert players reacted to Hofstadter's game as they did, one must understand something of modern game theory. Game theory is the analytical study of strategic situations. To draw conclusions from models of strategic situations, modern game theorists make two sorts of simplifying assumptions. The first is that the situation occurs only once. This temporal assumption yields models that effectively prohibit learning by doing. The second is that the same situation occurs repeatedly either with the same players or with players who are able to learn from the experience of other players. This timeless assumption yields models bounded by circumstance, but not time. In effect, these models are symmetric

with respect to time. These two simplifying assumptions divide game theory into temporal and timeless categories.

"Hofstadter created a clever anomaly to current game theory by creating a symmetrical model that prohibits learning. The multiple-player nature of his game creates symmetry. The one-time nature of his game prohibits learning. In doing so, he built a model that does not fit neatly into either the timeless or the temporal categories. It falls between the cracks of game theory. To true believers in game theory, it is not a game theory game. Hence, these true believers dismiss his conclusion that societies in which people compete well by considering symmetry before choosing a strategy, which Hofstadter calls *superrational* societies, will do better than *rational* societies.[8]

"***A Grander Anomaly***
Martin Gardner's inability to think about Hofstadter's game rationally and Hofstadter's claim that his game shows the superiority of what he calls superrational societies hint of a far grander anomaly. Considering symmetry in strategic situations does not fit modern models for thinking clearly. It is neither dialectical nor logical.

"The multiple-frame model of pursuing Wisdom addresses this anomaly. Playing games well is a matter of choosing the best frame for what we perceive is the given strategic situation. We best frame this problem by making the problem of framing this problem part of the problem we are trying to solve. This creates an endless loop: How do we choose the best frame? We choose the frame that best helps us decide well. How do we choose the best frame for choosing the best frame? We choose the frame that best helps us decide well. How do we choose the best frame for choosing the best frame for choosing the best frame? We choose the frame that best helps us decide well... Regardless of how many times we cycle through this endless loop, the answer is always that we choose the frame that best helps us decide well. From a purely logical view, this gets us nowhere. Each time we cycle through the loop, we end up back at our starting point. However, from the view of the multiple-frame model of pursuing Wisdom, each time we cycle through this loop, we expand the scope of the problem we are seeking to solve. This is consistent with Dwight Eisenhower's maxim, "If a problem cannot be solved, enlarge it." Taking this advice to its logical limit, we end with the problem that contains all other problems. We best address this universal problem by pursuing Wisdom. The problem of pursuing Wisdom is the same for all of us.

"From the view of the multiple-frame model of pursuing Wisdom, the end of competing well is Winning. Pursuing this timeless end well calls for winning over competitors to pursuing Wisdom. As we shall see in the next section, we best so this by increasing the tempo of change. Adapting to an ever-increasing pace of change well calls for pursuing Wisdom."

"[2] In the late 1970s, Hofstadter wrote a popular book on recursion, *Gödel, Escher, Bach, An Eternal Golden Braid*. At the time he sent out this letter, he was the author of the Metamagical Themas column in *Scientific American* magazine. 'Metamagical themas' is an anagram of 'mathematical games,' which was the the title of the Scientific American column Martin Gardner wrote from 1956 through 1980."

"[3] Hofstadter, Douglas *Metamagical Themas, Questing for the Essence of Mind and Pattern* (New York: Basic Books 1985), pp. 740–1."

"[4] Ibid., pp. 742–3."

"[5] Ibid."

"[6] Bruner, J. S. and Postman, L. "On the Perception of Incongruity: A Paradigm," Journal of Personality, XVIII (1949), 206-23."

"[7] Kuhn, Thomas, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1996), pp. 63-4."

"[8] *Metamagical Themas*, p. 764."

Chapter 7, The Scope of Strategy, new first three paragraphs

"The most important development in strategic thinking in the second half of the twentieth century was the idea of competing well by deciding well ever more quickly. The person most responsible for this idea was a United States Air Force (USAF) fighter pilot named John Boyd.

"The development of Boyd's ideas about competing well by deciding well ever more quickly began with a combat tour as an F-86 Sabre pilot in waning months of the Korean War. After returning from Korea, he was assigned to Nellis Air Force Base for further instruction. His skills were such that he stayed on as an instructor at the Fighter Weapons School. In the final months of his six years at Nellis, he wrote a manual on aerial combat, which became the handbook for close-in aerial combat tactics in the United States and, after it was declassified, around the world.[10]

"In 1961, the USAF offered Boyd a chance to return to college to earn a graduate degree to supplement his undergraduate degree in business and economics from the University of Iowa. He instead decided to earn an undergraduate degree in industrial engineering from George Tech University. While trying to explain what he did as a fighter pilot to a fellow student, Boyd used thermodynamic terms to describe close-in aerial combat. His extended metaphor worked so well that he decided to consider aircraft performance in terms of energy relations. He later worked with mathematician Tom Christie to refine what became known as Energy-Maneuverability (E-M) theory.[11]"

were changed to:

"The most important development in strategic thinking in the second half of the twentieth century was the idea of competing well by deciding well ever more quickly. The person most responsible for this idea was John Boyd.

"John Boyd was a United States Air Force officer. After a tour as an F-86 Sabre pilot in the closing months of the Korean War, the Air Force assigned Boyd to Nellis Air Force Base for further instruction. His skills were such that he stayed on as an instructor at the Fighter Weapons School for six years. Before leaving this post, he wrote a manual on aerial combat, which became the handbook for close-in tactics around the world. The Air Force then sent him back to college. While studying for an exam in thermodynamics, he had the insight to describe these tactics in terms of energy relations. He later worked with mathematician Tom Christie to refine this idea into what he called Energy-Maneuverability (E-M) theory.[10]"

Chapter 7, The Scope of Strategy, last two paragraphs

"E-M theory revolutionized not only the way people think about close-in aerial combat, but also the way people design fighter aircraft. Using E-M theory, Boyd predicted that the then current American fighter planes were inferior to their Soviet counterparts in terms of overall aircraft performance. The acceptance of E-M theory led the USAF to assign him to the F-X program. Boyd believed that the plane the USAF wanted, which was a massive, multipurpose, single-seat, swing-wing fighter, would do very poorly against Soviet fighters. In its place, he recommended a fixed-wing, lightweight fighter optimized for aerial combat. Facing the threat of being forced to purchase the Navy's swing-wing F-14 Tomcat rather than their swing-wing FX design, the USAF decided to change their F-X design to a smaller, fixed-wing air superiority fighter. This design became the F-15 Eagle.[12]

"Boyd believed that the F-15 Eagle was too large and too expensive. With the help of Pierre Sprey, Everest Riccioni, Chuck Myers, Tom Christie, and other members of what Riccioni called "the fighter mafia," Boyd was able to convince enough people within the military industrial complex to proceed with developing two lightweight fighter prototypes, the YF-16 and YF-17. "The fighter mafia" and their allies were later able to force the USAF to buy the YF-16. During the development process, the USAF changed the YF-16 from an inexpensive air-superiority fighter into a moderately expensive multirole fighter, the F-16 Fighting Falcon. The Navy eventually purchased a larger and more expensive multirole fighter based on the YF-17 design, the F-18 Hornet.[13]"

were changed to:

"E-M theory revolutionized not only the way people think about aerial combat, but also the way they design fighter aircraft. Using it, Boyd predicted that American fighter planes were inferior to their Soviet counterparts. This led the Air Force to assign him to a design program for a massive swing-wing fighter. He predicted that this plane would be a disaster. In its place, he proposed a lightweight fixed-wing fighter. The Air Force decided to change their design to a smaller fixed-wing fighter, which became the F-15 Eagle. Boyd believed that the F-15 was both too large and too expensive. With the help of fellow defense reformers, he was able to convince enough people within the military industrial complex to develop two lightweight fighter prototypes, the YF-16 and YF-17. These reformers were then able to force the Air Force to buy the YF-16. During the development process, the Air Force changed the YF-16 from an inexpensive air-superiority fighter into a moderately expensive

multirole fighter, the F-16 Fighting Falcon. The Navy eventually purchased a larger and more expensive multirole fighter based on the YF-17 design, the F-18 Hornet.[11]"

Chapter 7, *Temporal OODA Loop Analysis*, all paragraphs

"In 1975, Boyd retired from the USAF as a full colonel. He planned to refine his ideas about aerial combat and develop his ideas about how and why people learn. His friend and fellow defense reformer Pierre Sprey encouraged him to develop his ideas on maneuver warfare. Given his talents as a synthesizer of ideas, Boyd saw how each of these three issues fit into the larger problem of how best to compete well by deciding well ever more quickly.

"Boyd intuitively grasped that deciding well was a self-referential,self-similar process based on a decision cycle. Unlike the decision cycle put forth is this work, which concerns the essential sequence of finding a problem to solve, solving the problem, and learning from the experience; his essential sequence concerns observing the world, orienting oneself in the world, deciding on a course of action, and acting. He called this observe-orient-decide-act decision cycle an *OODA loop*.

"We can use Boyd's OODA loop model to solve temporal problems.[12] One such problem is the problem of predicting the performance of fighter planes in close aerial combat. There are cases in which E-M theory fails to predict well. The case that most concerned Boyd was the discrepancy between the actual and theoretical results of combat between F-86 pilots and MiG-15 pilots. According to analysis based solely on E-M theory, F-86 pilots should not have been as successful against MiG-15 pilots as they were. Boyd used his OODA loop model to look deeper. He concluded that F-86 pilots were able to overcome the relative deficiencies in their airplanes using tools that allowed them to observe, orient, decide, and act more quickly than their opponents. These tools included bubble canopies for better visibility, g-suits for greater resistance to acceleration, and hydraulic controls for less physically exhausting maneuvering. Unlike American P-38 pilots fighting against Japanese pilots in slower, but more maneuverable fighter planes a decade earlier, F-86 pilots fighting MiG-15 pilots were not limited to a single tactic. This made them appear more unpredictable and threatening to their opponents. It also made it possible to "get inside the decision cycles" of their opponents, where they could remain relatively safe until their opponents made an exploitable mistake.[13]"

were changed to:

"In 1975, Boyd retired from the Air Force as a full colonel. He planned to refine his ideas about combat and develop his ideas about how and why people learn. Fellow defense reformer Pierre Sprey encouraged him to develop his ideas on maneuver warfare. Given his talents as a synthesizer of ideas, Boyd saw how each of these three issues fit into the larger problem of how best to compete well by deciding well ever more quickly.

"Boyd grasped that deciding well was a self-referential, self-similar process based on a decision cycle. Unlike the decision cycle put forth is this work, which concerns the basic sequence of finding a problem to solve, solving the problem, and learning from the

experience; his basic sequence concerns observing the world, orienting oneself in the world, deciding on a course of action, and acting. He called this observe-orient-decide-act decision cycle an *OODA loop*.

"According to E-M theory, F-86 pilots should not have been as successful against MiG-15 pilots as they were. Boyd used his OODA loop model to look deeper. He concluded that F-86 pilots were able to overcome the E-M weaknesses of their airplanes by using tools that allowed them to decide faster than their opponents. These tools included bubble canopies, g-suits, and hydraulic controls. Deciding faster allowed F-86 pilots to "get inside the decision cycles" of their rivals, where they could remain relatively safe until their opponents made an exploitable mistake. Further, it gave them more options. Unlike American P-38 pilots fighting against Japanese pilots in slower, but more maneuverable Zero fighter planes a decade earlier, F-86 pilots fighting MiG-15 pilots were not limited to a single tactic. This made them appear more unpredictable and threatening to their opponents."

Chapter 7, *The Grandest Possible Strategy*, third paragraph

Changed "hearts and minds" to "minds and spirits" in the first sentence.

Chapter 8, Useful Reasoning, fourth paragraph

Changed "visions within the current frame" to "approximates of these two concepts" in the last sentence.

Chapter 8, Useful Reasoning, last paragraph

Changed "Hence" to "Thus" in the third sentence.

Appendix, *Folding in Processes*, second paragraph

Changed "Hence" to "Thus" in the second sentence.

Appendix, *Folding in Processes*, fourth paragraph

Changed "complexity" to "simplicity" in the first sentence.

Changes in Version 2011.05.26

Chapter 3, *A Decision-Tree Interpretation of Quantum Mechanics*, first three paragraphs

"One member of this new category is a model in which we assume that there are no constraints on gathering and using information. Information flows as freely as it does in the modern economic model of perfect competition. In this ideal model, people pursue Wisdom using the multiple-frame model of pursuing Wisdom. Hence, markets tend toward the

dynamic equilibrium of zero public entropy rather than the static equilibrium of Pareto optimality. When people pursue Wisdom, markets tend toward Justice.

"In this ideal model, all information, including wisdom, flows freely. What modern economists view as consuming is producing pleasure, joy, and wisdom.

"In this ideal model, people decide perfectly. In deciding perfectly, all people act as if they were a single decider facing a single problem, which is the public problem that contains all other problems."

were changed to:

"One member of this new category is a model in which we assume that there are no constraints on gathering and using information. Information flows as freely as it does in the modern economic model of perfect competition. However, this information includes not only information about how best to satisfy our wants, but also information about how best to satisfy our needs. In this ideal model, people decide perfectly with respect to all currently available Wisdom. In doing so, all people act as if they were a single decider facing a single problem, which is the public problem that contains all other problems."

Chapter 5, The Explicit Experiment, second paragraph

Changed "the view of the multiple-frame model of pursuing Wisdom" to "a scientific view" in the fifth sentence.

Changes in Version 2011.05.31

Preface, fifth paragraph

Inserted the following paragraph:

"Over time, we also collectively learn that we can build *multiple-frame* models of deciding well by defining a frame for each of the universal, boundless factors of deciding well that we currently know. We build these frames by defining the universal, boundless factor of deciding well and the means to this factor in terms of each other. We then use this set of (timeless / dialectical) frames to judge whether the problems we are considering trying to solve "ring true" with all that we currently know about deciding well. If a problem ring true, we have found a "beautiful" problem to solve. *We use the concept of beauty to help us choose problems to solve.* After we have found a problem to solve, we use the models that best help us predict what will happen within the bounds of our chosen problem to help us solve it."

Preface, new sixth paragraph

Changed "deciding well" to "pursuing the timeless end of deciding well" in the first sentence.

Preface, new ninth paragraph

Changed "In doing so, I explain" to "This includes both" in the last sentence.

Preface, new eleventh paragraph

Changed "claims" to "warnings" in the last sentence.

Chapter 1, Ever More Complete Multiple-Frame Models, last paragraph, footnote

"[14] Philosophers of science may find in this boundless approach to believing well parallels to W. V. O. Quine's naturalistic epistemology. A major difference is that the boundless approach embraces the whole of experience. The incompleteness of Quine's epistemology gave rise to both Jaegwon Kim's criticism of Quine's epistemology for not having a normative element and Morton White's argument with Quine over the scope of holistic pragmatism. *The philosophy of science is philosophy enough if and only if science includes the interwoven pursuits of all boundless factors of pursuing Wisdom*."

was moved to the end of the last paragraph of the Natural Reasoning section of the Reasoning Well chapter and changed to:

"[5] Philosophers of science may find in this pursuit parallels to W. V. O. Quine's naturalistic epistemology. A major difference is that the boundless approach embraces the whole of experience. The incompleteness of Quine's epistemology gave rise to both Jaegwon Kim's criticism of Quine's epistemology for not having a normative element and Morton White's argument with Quine over the scope of holistic pragmatism. *The philosophy of science is philosophy enough if and only if science includes the interwoven pursuits of all boundless factors of pursuing Wisdom*."

Chapter 3, *Public Order*, last paragraph

Changed "vehicle" to "bicycle" in the last sentence.

Chapter 3, *Zero Public Entropy*, fourth paragraph, third and fourth sentences

"In the cycling example above, one such blinder is the way we associate "cycling" with "bicycling." This tends to blind us to ways of replacing knowledge wealth for non-knowledge wealth."

was changed to:

"In the cycling example above, our concept of 'cycling race' tends to blind us to ways of replacing knowledge wealth for non-knowledge wealth."

Chapter 7, *A Grander Anomaly*, title

Changed "Grander" to "Greater" in the title.

Chapter 7, *A Grander Anomaly*, first paragraph

Changed "grander" to "greater" in the first sentence.

Chapter 7, *Temporal OODA Loop Analysis*, second paragraph, second sentence

"Unlike the decision cycle put forth is this work, which concerns the basic sequence of finding a problem to solve, solving the problem, and learning from the experience; his basic sequence concerns observing the world, orienting oneself in the world, deciding on a course of action, and acting."

was changed to:

"In this decision cycle, we observe the world, orient ourselves in the world, decide on a course of action, and act.[12]"

"[12] To address strategic problems using his inherently tactical model of deciding well, Boyd needed a timeless basis. He chose surviving and thriving on our own terms. This choice tends to blind us to seeking to cooperate well before we seek to compete well."

Chapter 7, *The Grandest Strategy*, third paragraph, last sentence

Added quotation marks around the quote "attracting the uncommitted, in magnifying their own spirit and strength, and in undermining the dedication and determination of their adversaries."

Chapter 7, *The Grandest Strategy*, last paragraph, second sentence

Italicized the sentence: "*Adopting this strategy calls for making the national goal pursuing Wisdom.*"

Chapter 8, Useful Reasoning, last paragraph, footnote

Added the sentence: "They may find that quantum mechanics offers deeper insights into the problems of language than early twentieth-century atomic theory offers."

Changes in Version 2011.06.04

Entire document

Checked hypens, en-dashes and em-dashes.

Preface, second paragraph, second through fourth sentences

"These people confuse the temporal ends of seeking the truth and seeking wisdom with the timeless end of seeking the truth and wisdom. In doing so, they fail to make the best use of what they currently know. To correct this mistake, I propose a timeless model of deciding well:"

were changed to:

"These people confuse the temporal with the timeless. They confuse taking the next step toward seeking the truth based on what they currently know and taking the next step toward seeking wisdom based on what they currently know with seeking the truth and wisdom based on all that anyone can ever know. In doing so, they fail to make the best use of what they currently know. To correct this mistake, I propose a timeless model of deciding well, a model of deciding well as a process rather than as a single event:"

Preface, second paragraph, last sentence

"These constraints concern not only solving temporal problems, but also learning how to solve temporal problems ever better."

was changed to:

"These constraints concern all three steps in the process."

Preface, third paragraph

Changed "model of deciding well" to "model" in the first sentence.

Changed "boundless factors of deciding well" to "boundelss factors" in the second sentence.

Changed "obvious" to "widely known" in the third sentence.

Preface, fourth paragraph

"Over time, we also collectively learn that we can build *multiple-frame* models of deciding well by defining a frame for each of the universal, boundless factors of deciding well that we currently know. We build these frames by defining the universal, boundless factor of deciding well and the means to this factor in terms of each other. We then use this set of (timeless / dialectical) frames to judge whether the problems we are considering trying to solve "ring true" with all that we currently know about deciding well. If a problem ring true, we have found a "beautiful" problem to solve. *We use the concept of beauty to help us choose problems to solve.* After we have found a problem to solve, we use the models that

best help us predict what will happen within the bounds of our chosen problem to help us solve it."

was changed to:

"We can use this insight into the nature of deciding well to build *multiple-frame* models to help us find problems to solve. We build these models by building a timeless frame for each of the universal, boundless factors that we know. We build each of these frames by defining the universal, boundless factor and the means to this factor in terms of each other. After we add what we currently know about the means to these factors, we use these frames to judge whether the problems we are considering trying to solve "ring true" with all that we currently know about deciding well. If a problem ring true, then we have found a "beautiful" problem to solve. After we have chosen a problem to solve, we may use the models that best help us predict what will happen within the bounds of our chosen problem to help us solve it."

Preface, fifth paragraph

"Students of Western thought may find in this multiple-frame model of pursuing the timeless end of deciding well a synthesis of the Platonic pursuit of ideal forms and the Aristotelian pursuit of natural forms. Like the Platonic pursuit, it involves pursuing knowledge of ideal forms. Unlike the Platonic pursuit, it is endless. We shall never see the whole truth by the light of all that is good. Like the Aristotelian pursuit, it involves replicable patterns of reasoning. Unlike the Aristotelian pursuit, it involves not only rules that bind beliefs together into coherent models of the world, but also rules for binding these models together into a coherent whole. The source of the coherence for binding these models together is the symmetry of deciding well."

was changed to:

"Students of Western thought may find in this process of deciding well a synthesis of the processes by which Plato and Aristotle pursued wisdom. Like the process of Plato, it involves pursuing knowledge of ideal forms. Unlike this process, it is endless. We shall never see the whole truth by the light of all that is good. Like the process of Aristotle, it involves rules of reason. Unlike this process, it involves not only rules that bind beliefs together into coherent models of the world, but also rules for binding these models together into a coherent whole. The source of the coherence for binding these models together is the symmetry of deciding well."

Preface, sixth paragraph

Changed "discover and use this basic model" to "use this model" in the first sentence.

Changed "know" to "currently know" in the second sentence.

Preface, seventh paragraph

Changed "virtuous circle" to "economic cycle" in the last sentence.

Preface, eighth paragraph

Changed "then" to "go on to" in the second sentence.

Preface, eighth paragraph, last sentence

"This includes both why modern economics leads us to underestimate the probability of great turbulence and why seeking to extend good times by lowering the quality of decisions is as shortsighted as seeking to prevent all forest fires."

was changed to:

"This includes why seeking to extend good times by lowering the quality of decisions is as shortsighted as seeking to prevent all forest fires."

Preface, ninth paragraph

Changed "go on to" to "then" in the second sentence.

Preface, tenth paragraph

Changed "timeless spiritual" to "religious" in the first sentence.

Changed "twin warnings that science without religion is lame and religion without science is blind" to "source of true art and science" in the last sentence.

Preface, twelfth paragraph

Changed "neither dialectical nor logical, but rather a synthesis of both" to "a synthesis of dialectics and logic" in the first sentence.

Changed "who are locked" to "locked" in the last sentence.

Preface, last paragraph

Changed "their lives" to "deciding well" in the last sentence.

Chapter 1, Setting Words Aright, second paragraph

Changed "patterns" to "forms (patterns)" in the first sentence.

Changed "pattern" to "form" in the last two sentences (two occurrences).

Chapter 1, Setting Words Aright, last paragraph

Changed "work" to "book" in the second sentence.

Chapter 1, Choosing Frames Well, first paragraph

Changed "one another" to "each other" in the fourth sentence.

Changed "conceptual structures" to "structures" in the last sentence.

Chapter 1, *The EOQ/RTS Example*, sixth paragraph

Changed "mass producing" to "mass-producing" in the third sentence.

Changed semicolons to commas and removed parenthetical numbers from the fifth sentence.

Chapter 1, *The EOQ/RTS Example*, seventh paragraph, last two sentences

"In short, Ohno's system swallows and digests complex problems."

was changed to:

"In swallowing and digesting complex problems, this strategy produces not only good products for sale, *but also good products in the form of knowledge of how to produce ever more wisely*."

Chapter 1, *The EOQ/RTS Example*, last paragraph

Changed "Ohno's strategy for learning" to "it" in the first sentence.

Changed "strategy" to "strategy for learning" in the last sentence.

Moved the footnote:

"[8] For more on Ohno's strategy for learning, see the appendix."

to the end of the preceding paragraph.

Merged this paragraph with the preceding paragraph.

Chapter 1, Profit, last paragraph, footnote

"[5] From the modern liberal view, people owe part of their profits to society for the use of socially-owned resources. According to modern liberals Gar Alperovitz and Lew Daly (*Unjust Deserts: How the Rich Are Taking Our Common Inheritance and Why We Should Take It Back*, New York: The New Press, 2008), people owe up to ninety percent of their incomes to society to pay for the use of knowledge that they use freely. Ought we to pay the debts we owe to the stewards of society in money or to the whole of life in good deeds?"

was changed to:

"[5] From the view of modern American liberals Gar Alperovitz and Lew Daly (*Unjust Deserts: How the Rich Are Taking Our Common Inheritance and Why We Should Take It Back*, New York: The New Press, 2008), we owe up to ninety percent of our incomes to our society for the use knowledge that we we freely. In effect, our society owns the rights to all knowledge in the public domain regardless of its source. From this thoroughly socialist view, we ought to pay these debts to the stewards of society in money, rather than to the whole of life in good deeds. As we shall see, this violation of the sovereign right to pursue Wisdom is a recipe for catastrophe."

Chapter 4, Useful Reminders, second paragraph

Changed "boundlessly-pragmatic" to "boundlessly pragmatic" in the second sentence.

Changes in Version 2011.06.08

Chapter 1, Choosing Frames Well, second paragraph

"The frames we use to reduce our sensations to concepts affects how we think about the world. Consider some of the many ways in which we may think about what it is to decide well. One way in which we can think about deciding well is to think about the way we overcome constraints in pursuit of our goals. These constraints include scarcity of such factors as time, clarity of mind, the quality of intellectual tools, and material resources. From within this frame, the meaning of the term 'well' in the phrase 'deciding well' concerns excellence in using resources."

was changed to:

"The frames we use to reduce our sensations to concepts affects how we think about the world. Consider some of the many ways in which we may think about deciding well. One way is to think about the way we overcome constraints in pursuing our ends (goals). These constraints include scarcity of such factors as time, clarity of mind, and material resources. From within this frame, the meaning of the term 'well' in the phrase 'deciding well' concerns excellence in using resources."

Chapter 1, Choosing Frames Well, third paragraph, first two sentences

"A second way in which we can think about deciding well is to think about the way in which we cope with the constraints we face. For example, we may classify the methods we use to decide into what we may call the three D's: deliberation (formal decision-making), decision rules (rules of thumb/heuristic methods), and discipline (consciously formed habits). Deliberation is thorough but costly in time and other resources. Decision rules are less thorough but also less costly. Discipline is the least thorough, least costly, but most resistant

to the harmful effects of deprivation, the lack of those things we need to live well. From within this frame, the meaning of the term 'well' in the phrase 'deciding well' concerns excellence in matching the method we use to the problem we face."

was changed to:

"A second way in which we may think about deciding well is to think about the method we use. Do we deliberate, use decision rules, or use discipline? Deliberating (deciding formally) is thorough but costly in time and other resources. Using decision rules (rules of thumb / heuristic methods) is less thorough but also less costly. Using discipline (consciously formed habits) is the least thorough, least costly, but most resistant to the harmful effects of deprivation, the lack of those things we need to live well. From within this frame, the meaning of the term 'well' in the phrase 'deciding well' concerns excellence in matching the method we use to the problem we face."

Chapter 1, Useful Frames, all paragraphs

"Addressing the problem of deciding well holistically calls for understanding what makes frames useful in deciding well. Useful frames are frames that help us achieve our ends. We may group useful frames into two types based on whether the ends that they address are *temporal* or *timeless*.[5] Temporal ends are goals that concern events; timeless ends are goals that concern processes. Winning a basketball game is a temporal end; playing basketball well is a timeless end. Again, temporal ends concern events; timeless ends concern processes.

"Temporal and timeless frames differ in their concepts of *excellence in means*. From a temporal frame, excellence in means is excellence in solving problems. Modern economists call excellence in solving problems *efficiency*. From the temporal frame of modern economics, to decide well is to decide efficiently. In contrast, from a timeless frame, excellence in means is excellence both in solving subordinate problems and in choosing subordinate problems to solve. Decision scientists call excellence in solving subordinate problems *efficiency* and excellence in choosing subordinate problems to solve *effectiveness*. From the timeless frame of decision science, to decide well is to decide both efficiently and effectively.[6]

"We base the temporal concept of excellence in means on what we know and on what we may learn that is useful for solving the temporal problem we have chosen to solve. In contrast, we base the timeless concept of excellence in means on what we know and what we may learn that is useful in addressing the timeless problem we have chosen to address.

"We can see this difference in formal decision-making. From a temporal frame, a formal decision *event* consists of (1) formulating alternatives; (2) evaluating alternatives; (3) choosing an alternative; and (4) implementing the chosen alternative. To decide well is to decide perfectly. In contrast, from a timeless frame, a formal decision *process* is the endlessly repeating cycle of (1) finding a subordinate problem to solve that appears to be in line with the timeless end of the process; (2) formulating alternative solutions to the chosen problem; (3) evaluating these alternatives; (4) choosing an alternative; (5) implementing the

chosen alternative; and (6) learning from the experience. To decide well is *not* to decide perfectly. Given our limited knowledge relative to the infinitely large problem we face, we cannot avoid making mistakes. When we make mistakes, we embed new mistakes into, or reinforce existing mistakes in, our networks of knowledge-in-use; that is, into our markets, technologies, legal systems, languages, scientific theories, and cultures. The dot-com bubble, household lead paint, the Versailles Treaty, the concept of wealth as precious metal coins and bullion, the Ptolemaic theory of the solar system, and countless forms of conspicuous consumption spring to mind. We muddle through a tangle of past mistakes. If we are wise, we learn from our mistakes. If we are wise, we learn to muddle forward ever more wisely."

were changed to:

"Addressing the problem of deciding well holistically calls for understanding what makes frames useful in deciding well. Useful frames are frames that help us achieve our ends. Some ends concern processes. We may call these *timeless ends*.[5] Playing basketball well is a timeless end. Other ends concern events. We may call these *temporal ends*. Winning a basketball game is a temporal end. In pursuing the timeless end of deciding well, we need frames to help us find problems to solve. We may call these *timeless frames*. We also need frames to help us solve problems that have temporal ends. We may call these *temporal frames*.

"Temporal and timeless frames differ in their concepts of *excellence in means*. From a temporal frame, excellence in means is excellence in solving problems. We may call this *efficiency*. To decide well is to decide efficiently. We base this concept of excellence in means on what we know and on what we may learn *that is useful for solving the temporal problem we have chosen to solve*. A formal decision *event* consists of formulating alternatives, evaluating alternatives, choosing an alternative, and implementing the chosen alternative. To decide well is to decide perfectly.

"In contrast, from a timeless frame, excellence in means is not only excellence in solving problems, but also excellence in choosing problems to solve. We may call the excellence in choosing problems to solve *effectiveness*.[6] To decide well is to decide both efficiently and effectively. We base this concept of excellence in means on what we know and what we may learn *that is useful in addressing the timeless problem we have chosen to address*. A formal decision *process* is the endlessly repeating cycle of (1) finding a temporal problem to solve that appears to be in line with our timeless end, (2) formulating various solutions to this problem, (3) evaluating these solutions, (4) choosing a solution, (5) implementing the chosen solution, and (6) learning from the experience. To decide well is *not* to decide perfectly. Given our limited knowledge relative to the infinitely large problem we face, we cannot avoid making mistakes. When we make mistakes, we embed new mistakes into, or reinforce existing mistakes in, our networks of knowledge-in-use. These networks include our markets, technologies, legal systems, languages, sciences, and cultures. If we are wise, we learn from our mistakes. If we are wise, we learn to muddle forward ever more wisely."

Chapter 1, *The EOQ/RTS Example*, first five paragraphs

"Modern economists call people who act according to a temporal view of deciding well "rational." In contrast, decision scientists call people who act according to a timeless view "wise." We can see the difference between acting "rationally" and acting "wisely" in two models for helping us to decide how often to set up machine tools. The first is the well-known economic order quantity (EOQ) model. The second is the less well-known rapid tool setting (RTS) model.

"Suppose our factory expects to sell 100,000 units of our new model electric car. Each of these cars needs a hood. The machine that makes these hoods also makes other parts. Each time we set up this machine tool it uses resources. Storing hoods and other parts also uses resources. How many hoods should we make at once? At one extreme, we might make one batch of 100,000 hoods. At the other extreme, we might make 100,000 batches of one hood. Between these two extremes lies the most efficient number to make at once. The EOQ model yields the number at which the marginal cost and marginal benefit of ordering one more hood per batch just equal one another. This number maximizes the net benefit of setting up the tool for our current knowledge of how to set up the tool.

"The temporal concept of deciding well inherent in the EOQ model does not allow for learning through experience. This deficiency tends to blind managers using the EOQ model to the possibility of learning. Managers who do not expect their workers to learn do not manage their workers in ways that encourage workers to learn. Until the Toyota practice of *rapid tool setting* (RTS) became popular, it was common for standard procedures for setting up machine tools to remain unchanged for years, even decades. In contrast, managers practicing RTS promote learning how to set up ever more efficiently through such means as training team members to learn, encouraging team members to share their ideas, and rewarding team members for learning.

"We can model RTS by combining an EOQ model with a mathematical function that relates the expected cost of setting up to the cumulative experience of setting up.[2] This timeless model disturbs people who like neat solutions. It tells us that we can choose to learn more quickly by setting up more often. Solving this model calls for pricing what we expect to learn. The inexhaustibility of knowledge makes this hard to do. We cannot price useful knowledge by measuring the value of the resources it replaces, except in the special case in which we know exactly when and how we will use the knowledge. Here, we do not know exactly when and how (1) we will use new knowledge of how to set up more quickly; (2) we will use new knowledge of how to learn more quickly; and (3) others will use both types of new knowledge. The possibility of learning turns what otherwise would be a simple closed-ended problem into a complex open-ended one.

"Toyota's experience with RTS shows us that the wise choice is not always the efficient choice. Toyota was able to cut metal stamping press setup times from several hours to less than ten minutes. Short setup times yield savings in warehouse space, material-handling equipment, material handlers, stock clerks, and other forms of indirect labor. Short setup times also reduce scrap. When team members set up wrongly, they need to scrap fewer parts. Short setup times even enhance learning. It is much easier for team members to remember

what they did wrong three hours ago than what they did wrong three weeks ago. With such great advantages, it is not surprising that the results of RTS have swept through industry."

"[7] Engineers and economists call this mathematical function an expected learning curve. They typically assume that doubling experience drops the cost per unit by some fixed percentage. The greater a team's ability to learn, the greater this percentage should be."

were changed to:

"We can see the difference between temporal and timeless frames in two models for helping us to decide how often to set up machine tools. The first is the temporal *economic order quantity* (EOQ) model. The second is the timeless *rapid tool setting* (RTS) model.

"Suppose our factory expects to sell 100,000 units of our new electric car. Each of these cars needs a hood. The machine tool that makes these parts also makes other parts. Setting up tools uses resources. Storing parts also uses resources. How many hoods should we make at once? At one extreme, we might make one batch of 100,000 hoods. At the other extreme, we might make 100,000 batches of one hood. Between these two extremes lies the most efficient number to make at once. The EOQ model yields the number at which the marginal cost and marginal benefit of ordering one more hood per batch just equal one another. This number maximizes the net benefit of setting up the tool *for our current knowledge of how to set up the tool*.

"The temporal frame of the EOQ model includes the assumption that people do not learn through experience. This assumption tends to blind people to the possibility of learning. Managers who do not expect their people to learn do not manage them in ways that encourage them to learn. In contrast, managers practicing rapid tool setting promote learning through such means as training tool-setters to learn and rewarding them for learning.

"We may model rapid tool setting by combining an EOQ model with an expected learning curve for setting up the tool.[7] The resulting timeless model disturbs people who like neat solutions. It tells us that we can choose to learn more quickly by setting up more often. Solving this model calls for pricing what we expect to learn. The inexhaustibility of knowledge makes this very hard to do. We cannot price useful knowledge by measuring the value of the resources it replaces, except in the special case in which we know exactly when and how we will use the knowledge. Here, we do not know exactly when and how (1) we will use new knowledge of how to set up more quickly; (2) we will use new knowledge of how to learn more quickly; and (3) others will use both types of new knowledge. The possibility of learning turns what otherwise would be a simple closed-ended problem into a complex open-ended one.

"The benefits of short setup times go far beyond savings in direct labor and capital costs. Short setup times yield savings in warehouse space, material-handling equipment, material handlers, stock clerks, and other forms of indirect labor. They also reduce scrap. When production team members set up wrongly, they need to scrap fewer parts. Short setup times even enhance learning. It is much easier for team members to remember what they did wrong

three hours ago than what they did wrong three weeks ago. With such great advantages, it is not surprising that the knowledge of how to set up tools rapidly has swept through industry."

"[7] An expected learning curve is a mathematical function that relates the expected cost of setting up to the cumulative experience of setting up. Engineers and economist typically assume that doubling experience drops the cost per unit by some fixed percentage. The greater a team's ability to learn, the greater this percentage should be."

Chapter 1, *The EOQ/RTS Example*, last two paragraphs

Changed "RTS" to "learning to set up tools rapidly" and "part" to "role" in the first sentence of the sixth paragraph.

Deleted "producing ever more leanly by" from the sixth sentence.

Changed "*wisely*" to "*efficiently and effectively*" in the fifth sentence of the last paragraph.

Changed "it" to "this strategy" in the sixth sentence of the last paragraph.

Changed "RTS" to "learning to set up tools rapidly" and "strategy for learning" to "strategy" in the last sentence of the last paragraph.

Chapter 1, *The Need for Timeless Frames*, first paragraph, first three sentences

"Ohno's strategy for learning calls for all team members to improve their work continually. This in turn calls for good people, humane conditions, cooperation, and a timeless frame of deciding well. A timeless frame for deciding well is confusing to people who are locked into a temporal frame."

were changed to:

"Timeless frames confuse people locked into temporal frames."

Chapter 1, *The Need for Timeless Frames*, first paragraph, first bullet point

Changed "This is because good" to "Good" in the second sentence.

Chapter 1, Temporal versus Invariant Values, first paragraph

"Ohno's strategy for learning shows us how we can use the timeless concept of deciding well to help us find better temporal problems to solve. We can also use this concept to help us find better timeless problems to solve. To understand this, we need to distinguish between the temporal and timeless concepts of the ideals that we use to choose problems to solve. We commonly call these ideals *values*."

was changed to:

"We have seen how the timeless concept of deciding well can help us find better *temporal* problems to solve. We can also use it to help us find better *timeless* problems to solve. This calls for distinguishing between the temporal and timeless values that we use to choose problems to solve."

Chapter 1, Temporal versus Invariant Values, third paragraph, footnote, first sentence

"The change in case from the temporal view third person plural to the timeless view first person plural is not a mistake."

was changed to:

"Taking a timeless view of deciding well does not call for us to abandon the study of texts. It only calls for us to interpret texts in light of pursuing Wisdom. Lovers of Wisdom call this study *hermeneutics*. Note that the change in case from the temporal view third person plural to the timeless view first person plural is not a mistake."

Chapter 1, Temporal versus Invariant Values, fifth paragraph

Changed "new bird" to "new species" in the fifth sentence.

Chapter 1, Temporal versus Invariant Values, sixth paragraph

Changed "planting rule" to "rule" in the last sentence.

Chapter 1, *Steps for Building Multiple-Frame Models*, first paragraph

Changed "one another" to "each other" in the last sentence.

Chapter 1, *Steps for Building Multiple-Frame Models*, last paragraph, end

Added the sentence: "The technique of reducing complex wholes to multiple frames opens more of our ability to recognize patterns to reason, thereby helping us to better integrate these two abilities."

Chapter 1, *Ever More Complete Multiple-Frame Models*, first paragraph, last sentence

"We then recognize that Wisdom is a boundless factor of the Good."

was deleted.

Changes in Version 2011.06.14

Acknowledgments, second paragraph

Changed "solve this infinitely large problem" to "address this infinitely large problem logically" in the ninth sentence.

Chapter 1, Setting Words Aright, first paragraph

Changed "terms (containers for meaning) and concepts (meanings)" to "terms and concepts, between containers for meaning and meanings" in the first sentence.

Chapter 2, Invariant Tools for Living Well, first paragraph, last two sentences

"In contrast, from the view of the multiple-frame model of pursuing Wisdom, we live well by using invariant intellectual tools to help us find temporal problems to solve and temporal intellectual tools to help us solve temporal problems. We live well by planning our lives using invariant tools and working our plans using temporal tools."

were changed to:

"In contrast, from the view of the multiple-frame model of pursuing Wisdom, we live well by planning our lives using invariant tools and working our plans using temporal tools. We use invariant tools to find temporal problems to solve and temporal tools to solve these problems."

Chapter 2, Invariant Tools for Living Well, second paragraph, end

Added the sentences:

"In this chapter, the *temporal view* is the temporal view of modern economics. In the remainder of this work, the *multiplex view* is the multiple-frame mental view of pursuing Wisdom.[2]"

"[2] The term 'multiplex view' comes from biologist Jack Cohen and mathematician Ian Stewart's book, *Figments of Reality: The Evolution of the Curious Mind* (Cambridge, England: Cambridge University Press, 1997). Cohen and Stewart describe a recursive evolutionary process that creates the need for ever more complex ways of thinking clearly. What is missing from this Mandevillian work is the symmetry of pursuing Wisdom, hence the convergence of approximate-multiplex mental views toward a transcendental-multiplex mental view, which theists may call "a God's eye view." Note that such convergence occurs only when our ability to think clearly about the world progresses faster than the complexity of the world, and that this complexity emerges not only from the symmetry of nature per se, but also from the broken symmetry of nature, which includes the broken symmetry of pursuing Wisdom. Foolishness makes the task of thinking clearly about the world doubly hard."

Chapter 2, Wealth, first paragraph

"From the temporal frame of modern economics, wealth is what people need to live well based on what they currently know. Wealth concerns what we currently want. From the view of the multiple-frame model of pursuing Wisdom, wealth is what we need to live well based on all that we can ever know. Wealth concerns what we truly need, which is resources useful in pursuing Wisdom."

was changed to:

"From the temporal view, wealth is what people need to live well based on what they currently know; it is what they *currently want*. From the multiplex view, wealth is what we need to live well based on all that we can ever know; it is what we *truly need to pursue Wisdom*."

Chapter 2, Consumption, first paragraph, first through fifth sentences

"Consuming is the process of using wealth to live well. From the temporal frame of modern economics, actions reveal preferences, which is to say that people never make mistakes. Thus, winning a fortune in the lottery is always good for people. From the view of the multiple-frame model of pursuing Wisdom, we make mistakes. Thus, winning a fortune in the lottery can be bad for us. Understanding this difference calls for a deeper understanding of pleasure and pain."

were changed to:

"Consuming is the process of consuming wealth. The end of this process is living well. From the temporal view, people never make mistakes; their actions reveal their preferences; and winning the lottery can never be bad. From the multiplex view, we make mistakes; our actions reveal our characters; and winning the lottery may be bad if we have a poor character. Understanding this difference calls for distinguishing between pleasure and joy."

Chapter 2, *Pleasure and Pain*, first two paragraphs

"We can conceive of pleasure and pain as mental signals that help guide us to undertake good activities and avoid bad ones. An activity is good for us when it satisfies our current needs and bad when it diminishes us. Regrettably, pleasure and pain are not perfect indicators of whether an activity is good or bad. Eating food that is bad for us is often pleasurable. The first few minutes of exercise are often painful. Because pleasure and pain are not perfect signals, we cannot rely solely on them to tell us whether an activity is good or bad.

"We can also conceive of two types of pleasure. The first is the pleasure that comes from totally involving or immersing ourselves in activity. Aristotle described this type of pleasure as losing ourselves in activity.[2] To give us this type of pleasure, an activity must not be too easy or too hard. Activity that does not challenge us is boring. Activity that challenges us too much is overwhelming. Between these extremes is a level that enables us to lose ourselves in activity. We may call this type of pleasure *pleasure-in-acting*. Following this reasoning, we may also call anything that hinders our losing ourselves in activity *pain-in-acting*."

were changed to:

"Pleasure and pain help us distinguish between acts that help us live well and those that hinder us from living well. Regrettably, cannot rely solely on pleasure and pain to tell us whether an act is good or bad. We often experience pain at the start of healthy exercise. We often experience pleasure when eating unhealthy foods.

"We may distinguish between two types of pleasure and pain. The first type of pleasure comes from totally involving or immersing ourselves in acting. Aristotle described this type of pleasure as losing ourselves in acting.[2] To yield this type of pleasure, an act must not be too easy or too hard. An act that does not challenge us is boring. An act that challenges us too much is overwhelming. Between these extremes is a level that allows us to lose ourselves in acting. We may call this type of pleasure *pleasure-in-acting*. The first type of pain comes from anything that hinders us from losing ourselves in acting. We may call this type *pain-in-acting*."

Chapter 2, *Pleasure and Pain*, third paragraph

Changed "our losing ourselves" to "us from losing ourselves" in all (2 occurrences).

Chapter 2, *Pleasure and Pain*, fourth paragraph

Changed "activities" to "acts" in the last sentence.

Chapter 2, *Pleasure and Pain*, sixth paragraph

Changed "simply being" to "being" in the second sentence.

Chapter 2, *Pleasure and Pain*, sixth paragraph, last sentence

"Following this reasoning, we may call the condition that arises from failing to satisfy our needs *pain-in-being*."

was changed to:

"The second type of pain is the pain of deprivation, the pain of needs not satisfied. We may call this type *pain-in-being*."

Chapter 2, *Pleasure and Pain*, eighth paragraph, second sentence

Changed "Joy raises" to "Joyful acts raise" in the second sentence.

Chapter 2, *Tools for Pursuing the Good*, entire section

"***Tools for Pursuing the Good***
Aristotle and Spinoza provide us with different means of living well. Aristotle asks us to look

for moral virtue in others. He believed that moral virtue is the habit of wanting the right things, which we develop by acting as if we want the right things. In contrast, Spinoza asks us to look into ourselves. He believed that moral virtue is the ability to address the causes of our emotions rationally, which we develop by learning to understand our needs and the best means of satisfying them.

"Spinoza's means of living well fits a contemplative life better than an active one. It is easier to identify our needs in a monastery than it is in a trading pit. It is not surprising that aspiring Einsteins prefer Spinoza's ethics and aspiring Alexanders prefer Aristotle's.

"A danger of choosing to live the active life is falling into the habit of preferring pleasure to joy. Similarly, a danger in choosing the contemplative life is falling into the habit of preferring joy to pleasure. The Taoist tradition provides us with concepts to help us understand these two problems. From the Taoist view, living well is a matter of balancing *yin* and *yang*. In this context, *yin* is the desire for joy/pleasure-in-being; *yang* is the desire for pleasure/pleasure-in-acting. When we have too much *yang*, we pursue pleasure too much. When we have too much *yin*, we pursue joy too much. When *yin* and *yang* are in balance, we pursue the virtuous circle of pleasure and joy.

"Another danger is failing to consider the choices we make. The Hindu tradition provides us with concepts to help us understand this problem. The Sãmkhya doctrine of the three gunas recognizes that all living things are mixtures of *sattva* (lucidity), *rajas* (passion), and *tamas* (dark inertia). When lucidity prevails, we pursue pleasure and joy; when passion prevails, we pursue pleasure; and when dark inertia prevails, we pursue nothing. People who pursue nothing, who blindly follow their leaders or culture, are the most likely to fall into the vicious cycle of poverty.

"In addition to tools for helping us choose a wise course of action, we also need tools for staying true to the course of action we believe to be wise. In philosophical terms, we need tools to help us be continent. For example, we need tools to help us know when our emotions and appetites overwhelm our faculties, hence when we ought to abandon deliberation for discipline. One solution to this problem is a list of warning signals, Dante's seven deadly sins: lust, gluttony, greed, sloth, wrath, envy, and pride."

was changed to:

"***Tools for Pursuing Pleasure and Joy***
Pursuing the virtuous circle of pleasure and joy calls for tools for helping us choose paths forward. From the Indian tradition, the Sãmkhya doctrine of the three gunas recognizes that all living things are mixtures of *sattva* (lucidity), *rajas* (passion), and *tamas* (dark inertia). When lucidity prevails, we pursue pleasure and joy; when passion prevails, we pursue pleasure; and when dark inertia prevails, we pursue nothing. People who pursue nothing, who blindly follow their leaders or culture, are the most likely to fall into the vicious cycle of poverty.

"From the Western tradition, Spinoza and Aristotle provide us with very different means of living well. Spinoza asks us to look into ourselves. He believed that moral virtue is the ability to address the causes of our emotions rationally, which we develop by learning to understand our needs and the best means of satisfying them. His means of living well fits a contemplative life better than an active one. It is easier to know our needs in a monastery than it is in a trading pit. In contrast, Aristotle asks us to look for moral virtue in others. He believed that moral virtue is the habit of wanting the right things, which we develop by acting as if we want the right things. His disciplined means of living well fits an active life better than a contemplative one. Spinoza inspires Einsteins; Aristotle inspires Alexanders.

"In addition to tools for helping us choose wise paths forward, we also need tools for staying true to these paths. A danger of choosing to live the active life is falling into the habit of preferring pleasure to joy. Similarly, a danger in choosing the contemplative life is falling into the habit of preferring joy to pleasure. The Taoist tradition provides us with concepts to help us understand these two problems. From the Taoist view, living well is a matter of balancing *yin* and *yang*. In this context, *yin* is the desire for joy/pleasure-in-being; *yang* is the desire for pleasure/pleasure-in-acting. When we have too much *yang*, we pursue pleasure too much. When we have too much *yin*, we pursue joy too much. When *yin* and *yang* are in balance, we pursue the virtuous circle of pleasure and joy. From the Western tradition, we need tools to help us know when our emotions and appetites overwhelm our faculties, hence to know when we ought to abandon deliberation and decision rules for discipline. One solution to this problem is a list of warning signals, Dante's seven deadly sins: lust, gluttony, greed, sloth, wrath, envy, and pride."

Chapter 2, *Chicago Screwdrivers*, first paragraph, second through ninth sentences

"Just as we ought never to use hammers to drive in screws, we ought never to use variant tools to find problems to solve. One of the greatest dangers of this comes from using tools that either concern or ought to concern consumption to guide our actions. Consider the concepts of human capital, work, and leisure. From the temporal view of modern economics, human capital is knowledge that raises our income; work is an *unpleasant* activity that others pay people to perform; and leisure is time spent not working. People aim to *please* themselves by consuming economic goods during their leisure time. People work in order to consume. Living well calls for us to *balance* work and leisure. In contrast, from the view of the multiple-frame model of pursuing Wisdom, human capital is knowledge that helps us to satisfy our needs; work is *any* activity that others pay us to perform; and leisure is time spent satisfying our needs."

were changed to:

"Just as we ought never to use hammers to drive in screws, we ought never to use temporal tools to find problems to solve. One of the greatest dangers of this comes from using modern economic tools to find problems to solve. Consider the concepts of human capital, work, and leisure. From the temporal view of modern economics, human capital is knowledge that raises our income; work is an *unpleasant* activity that others pay people to perform; and leisure is time spent not working. People aim to *please* themselves by consuming economic

goods during their leisure time. They work in order to consume. Living well calls for them to *balance* work and leisure. In contrast, from the multiplex view, human capital is knowledge that helps us to satisfy our needs; work is *any* activity that others pay us to perform; and leisure is time spent satisfying our needs."

Chapter 2, Trade, second paragraph

"From the temporal frame of modern economics, business firms emerge from the high cost of transactions.[4] In contrast, from the view of the multiple-frame model of pursuing Wisdom, the structure of commerce emerges from the high fixed cost of trade relations. As we learn ever more about trading, these costs fall; extraordinary business events become ever more ordinary; firms become ever less firm; and commercial entities larger than firms become ever more prominent. These larger entities include both geographical clusters, such as Hollywood and the Silicon Valley, and entire sectors, notably the financial sector."

was changed to:

"From the temporal view of modern economics, business firms emerge from the high cost of transactions.[4] In contrast, from the multiplex view, structures of commerce emerge from the high fixed cost of trade relations. As these costs fall, firms become ever less firm and structures larger than firms become ever more prominent. These structures include both geographical clusters, such as Hollywood and the Silicon Valley, and entire sectors, notably the financial sector."

Chapter 2, *Trust*, first two paragraphs

"Trade requires that trading partners trust one another to fulfill their roles in the trade relation. Trust is the belief that a person or thing will act as expected.

Trust is especially useful in the production and trade of knowledge. Knowledge assets are harder to protect from theft than are non-knowledge assets. Thieves can easily copy many forms of knowledge, which makes them easy to steal. Stealing knowledge does not prevent its owner from using it, which makes the theft of knowledge easier to hide. The legal recourse for stolen knowledge tends to be more expensive than it is for material resources, where evidence of theft is more clear-cut and the legal precedents are better established. Trust promotes the use of knowledge by lowering the cost of protecting knowledge."

was changed to:

"Trading well calls for trading partners to trust one another to fulfill their roles in the trade relation. Trust is the belief that a person or thing will act as expected.

"*Trust promotes creating and using knowledge by lowering the cost of protecting knowledge*. Knowledge assets are harder to protect from theft than are non-knowledge assets. Thieves can easily copy many forms of knowledge, which makes them easy to steal. Stealing knowledge does not prevent its owner from using it, which makes the theft of knowledge

easier to hide. The legal recourse for stolen knowledge tends to be more expensive than it is for material resources, where evidence of theft is more clear-cut and the precedents are better established. By lowering the cost of protecting knowledge, trust promotes knowledge."

Chapter 2, *Trust*, last paragraph

Changed "strategic assets" to "forms of wealth" in the first sentence.

Chapter 2, Three Common Mistakes, all paragraphs

"Three common mistakes tend to blind us to better means of trade. The first is the belief that we cannot improve the means of trade. This belief led John Maynard Keynes to see the slowness of the price of labor to fall in response to a fall in the demand for labor ("sticky wages") as a problem to work around rather than a problem to solve. It also led most Western experts to see the Toyota system as a set of techniques rather than as a means of creating techniques that involve paying workers not only for their skilled hands but also for their trained minds.

"The second mistake is the belief that the only knowledge that we need to purchase well is the knowledge of a good's quality and price. We may also need to know about the conditions of its production. For example, buying teak from a source certified to grow and harvest teak in an environmentally friendly way can help us satisfy our need to be part of something greater than ourselves, and so may be worth more to us than buying otherwise identical teak from an uncertified source.

"The third mistake is the belief that competition is the opposite of cooperation. When excellence calls for cooperation, promoting competition tends to promote cooperation. For example, shoppers in the Soviet Union wasted billions of hours standing in lines, many standing in line three times for the same purchase: once to select an item, a second to pay for it, and a third to collect it. In contrast, competition prompted early twentieth-century American merchants to invent stores in which shoppers cooperate with merchants by collecting the items they want to buy. Such self-service stores save shoppers time and money. In recent years, some merchants have taken this a step further by allowing customers to pay for their items in self-checkout lines."

were changed to:

"Three common mistakes tend to blind us to better means of trade. The first is the belief that we cannot improve the means of trade. This belief led John Maynard Keynes to see the slowness of the price of labor to fall in response to a fall in the demand for labor ("sticky wages") as a problem to work around rather than a problem to solve. It also led most Western experts to see the Toyota system as a set of techniques for producing leanly rather than as a strategy for learning how to produce ever more leanly. These experts could imagine copying techniques for setting up tools rapidly, but not the means of trade for learning to set up tools ever more rapidly.

"The second mistake is the belief that purchasing well calls for knowledge of intrinsic product quality, but not knowledge of its source. This belief leads people to believe that teak is teak regardless of its source. This ignores our need to be part of something greater than ourselves.

"The third mistake is the belief that competition is the opposite of cooperation. In the long run, competing well calls for cooperating well. Shoppers in the Soviet Union wasted billions of hours standing in one line to select an item, a second to pay for it, and a third to collect it. In contrast, competition in the United States prompted merchants to invent self-service stores, stores in which shoppers collect the items they want to buy. In recent years, it has also prompted merchants to invent self-checkout stores, stores in which shoppers register and bag the goods they have collected. These inventions in the means of trade save shoppers both time and money."

Chapter 2, Production, first paragraph

"Production is the intended result of producing well. From the temporal frame of modern economics, people *do not* intend to learn from experience, thus production does not include what people learn through experience. As we saw in the economic order quantity (EOQ) example, producing well does not call for learning-by-doing. In contrast, from the view of the multiple-frame model of pursuing Wisdom, we *do* intend to learn from experience, thus production includes what we learn from experience. As we saw in the rapid tool setting (RTS) example, producing well calls for learning-by-doing. In modern economic terms, it calls for pushing back our production-possibility frontiers."

was changed to:

"Production is the intended result of producing well. From the temporal view, people *do not* intend to learn through experience, to push back their "production-possibility" frontiers. Thus, production does not include what people learn through experience. In contrast, from the multiplex view, we *do* intend to learn through experience, to push back our "efficiency" frontiers. Thus, production includes what we learn through experience."

Chapter 2, Taxation, first paragraph

Changed "temporal frame of modern economics" to "temporal view" in the second sentence.

Chapter 2, Taxation, second paragraph

"From the view of the multiple-frame model of pursuing Wisdom, the power to tax is the power to induce the creation and use of particular knowledge. Taxing the number of chimneys in houses will induce the creation and use of knowledge of how to live with fewer chimneys. Similarly, taxing the number of animals used in medical experiments will induce the creation and use of knowledge of how to experiment using fewer animals."

was merged with the first and changed to:

"From the multiplex view, the power to tax is the power to induce the creation and use of knowledge. Taxing the number of chimneys in houses will induce the creation and use of knowledge of how to live with fewer chimneys. Similarly, taxing the number of animals used in experiments will induce the creation and use of knowledge of how to test using fewer animals."

Chapter 2, Profit, all paragraphs

"From the temporal frame of modern economics, profit is what remains of a stream of income after people have paid fair market value for all the resources they used to produce it. From the view of the multiple-frame model of pursuing Wisdom, profit is the return on deciding well.

"From the classical liberal view, people are free to spend the profits they earn as they please. In contrast, from the view of the multiple-frame model of pursuing Wisdom, we owe debts to those people who created the knowledge we use freely, and to the whole of life for providing us with the natural resources we use freely. We pay these debts by pursuing Wisdom.[6]"

"[6] From the view of modern American liberals Gar Alperovitz and Lew Daly (*Unjust Deserts: How the Rich Are Taking Our Common Inheritance and Why We Should Take It Back*, New York: The New Press, 2008), we owe up to ninety percent of our incomes to our society for the use knowledge that we use freely. In effect, our society owns the rights to all knowledge in the public domain regardless of its source. From this thoroughly socialist view, we ought to pay these debts to the stewards of society in money, rather than to the whole of life in good deeds. As we shall see, this violation of the sovereign right to pursue Wisdom is a recipe for catastrophe."

were changed to:

"From the temporal view, profit is what remains of a stream of income after people have paid for all the resources they used to produce it. People are free to spend the profits they earn as they please. From the multiplex view, profit is the return on deciding well. We owe debts to those people who created the knowledge we use freely, and to the whole of life for providing us with the natural resources we use freely. We pay these debts by pursuing Wisdom.[6]"

"[6] From the view of modern American liberals Gar Alperovitz and Lew Daly (*Unjust Deserts: How the Rich Are Taking Our Common Inheritance and Why We Should Take It Back*, New York: The New Press, 2008), we owe up to ninety percent of our incomes to our society for the use knowledge that we use freely. In effect, our society owns the rights to all knowledge in the public domain regardless of its source. From this thoroughly socialist view, we ought to pay these debts to the stewards of society in money rather than to the whole of life in good deeds paid forward. As we shall see, violating our natural right to pursue Wisdom is a recipe for catastrophe."

Chapter 2, A Strategy for Learning Well, first paragraph, last two sentences

"Given the success of this strategy, we ought to learn ever more about good people and good products. To do so well, we need to pursue Wisdom using the multiple-frame model of pursuing Wisdom."

were changed to:

"We pursue pursue this virtuous circle well by pursuing Wisdom using the multiple-frame model of pursuing Wisdom."

Chapter 3, Pursuing the Ring of Truth, first paragraph, last three sentences

"Accordingly, we define the timeless frame for pursuing Beauty by defining contemplating well and the timeless end of contemplating well in terms of one another. By itself, this timeless frame is useless. However, we can make it useful in pursuing Wisdom by making it part of the multiple-frame model of pursuing Wisdom"

were made into a new paragraph and changed to:

"According to the steps for building multiple-frame models, we define the timeless frame for pursuing Beauty by defining contemplating well and Beauty in terms of each other. By itself, this timeless frame is useless. We make it useful by making it part of the multiple-frame model of pursuing Wisdom."

Chapter 3, Pursuing the Ring of Truth, new third paragraph

Changed "not be too simple or too hard" to "be neither too simple nor too hard" in the second and fourth sentences (2 occurrences).

Chapter 3, Pursuing the Ring of Truth, new fourth paragraph

Changed "we contemplate" to "that we contemplate" in the first and second sentences (2 occurrences).

Changed "within the context" to "the multiplex view" in the second sentence.

Changed "living well" to "believing well" in the last sentence.

Chapter 3, Pursuing the Ring of Truth, last paragraph

Changed "In summary, by" to "By" in the first sentence.

Chapter 3, Leaving Behind Modern Explanations, fourth paragraph

Changed "transcendent recursive objects" to "objects" in the second sentence.

Chapter 3, Leaving Behind Modern Explanations, last paragraph

Changed "incomplete" to "partial" in the fourth sentence.

Chapter 3, *Three Approaches to Policy*, first paragraph

Changed "view of the multiple-frame model of pursuing Wisdom" to "multiplex view" in the second sentence.

Deleted the sentence: "If wishes were horses beggars would ride."

Chapter 3, *Three Approaches to Policy*, fourth paragraph

Changed "view of the multiple-frame model of pursuing Wisdom" to "multiplex view" in the second sentence.

Chapter 3, *Public Order*, first paragraph

Changed "this view" to "engineering view" in the last sentence.

Chapter 3, *Public Order*, second paragraph

Changed "this view" to "biological view" in the last sentence.

Chapter 3, *Public Order*, third paragraph

Changed "this view" to "public view" in the last sentence.

Chapter 3, *Public Order*, fourth paragraph

Changed "can" to "may" in the first sentence.

Chapter 3, *Zero Public Entropy*, last paragraph

Changed "decide well" to "pursue Wisdom" in the third sentence.

Chapter 3, *A Decision-Tree Interpretation of Quantum Mechanics*, third paragraph

Changed "the invariant view of decision science" to "the view of decision science" in the second sentence.

Chapter 3, *A Decision-Tree Interpretation of Quantum Mechanics*, last paragraph

Changed "view of the multiple-frame model of pursuing Wisdom" to "multiplex view" in the last sentence.

Chapter 3, *A Decision-Tree Interpretation of Quantum Mechanics*, first paragraph

Changed "Wisdom" to "knowledge" in the fourth sentence.

Chapter 3, *A Decision-Tree Interpretation of Quantum Mechanics*, second paragraph

Merged this paragraph with the first paragraph.

Deleted the last sentence: "This is compatible with the decision interpretation of quantum mechanics."

Chapter 4, entire chapter

Changed "view of the multiple-frame model of pursuing Wisdom" to "multiplex view" all (8 occurrences).

Chapter 4, Refining Everyday Thinking, last paragraph

Changed "the view" to "a view" in the first sentence.

Chapter 4, *Metascience*, second paragraph

Changed "choosing timeless problems" to "choosing problems" in the first sentence.

Changed "models we use" to "models that we use" in the last sentence.

Chapter 4, *Two Types of Ignorance*, first paragraph

Changed "descriptions of what we need to do in order to rid ourselves of ever more ignorance" to "explanations of causation" in the second sentence.

Chapter 4, *Two Types of Ignorance*, second paragraph

Changed "the invariant method" to "this method" in the first sentence.

Chapter 4, *Two Types of Ignorance*, last paragraph

Changed "thus" to "hence" in all (3 occurrences).

Chapter 4, Refining Deciding Well, second paragraph

Changed "temporal problems" to "problems" in the third sentence.

Chapter 5, entire chapter

Changed "view of the multiple-frame model of pursuing Wisdom" to "multiplex view" all (7 occurrences).

Chapter 6, entire chapter

Changed "view of the multiple-frame model of pursuing Wisdom" to "multiplex view" all (2 occurrences).

Chapter 6, A Common Timeless End, first paragraph

Changed "the materialist view" to "a materialist view" in the first sentence.

Changed "the dualist view" to "a dualist view" in the second sentence.

Changed "both of these views" to "both types of multiplex views" in the fourth sentence.

Chapter 7, entire chapter

Changed "view of the multiple-frame model of pursuing Wisdom" to "multiplex view" all (2 occurrences).

Chapter 7, first paragraph

Added the heading "The Scope of Competing Well."

Chapter 7, *A Classic Anomaly*, first paragraph

Changed "They" to "Bruner and Postman" in the fifth sentence.

Chapter 7, *A Classic Anomaly*, second paragraph

Changed "but not time" to "but not by time" in the seventh sentence.

Chapter 7, *A Classic Anomaly*, last paragraph

Changed "the timeless or the temporal" to "the temporal or the timeless" in the third sentence.

Chapter 7, *A Greater Anomaly*, first paragraph

Changed "dialectical nor logical" to "logical nor dialectical" in the last sentence.

Chapter 7, The Scope of Strategy, second paragraph

Changed "a United States Air Force officer" to "an officer in the United States Air Force" in the first sentence.

Chapter 7, The Scope of Strategy, third paragraph

Changed "moderately expensive" to "more expensive" in the second to last sentence.

Changed "more expensive" to "even more expensive" in the last sentence.

Chapter 7, *Timeless OODA Loop Analysis*, first paragraph

Changed ""temporal" OODA loop model" to "basic cycle" in the first sentence.

Chapter 8, entire chapter

Changed "view of the multiple-frame model of pursuing Wisdom" to "multiplex view" all (2 occurrences).

Chapter 8, Useful Reasoning, first paragraph

Changed "Uncertain predictions hinder" to "Uncertainty in predictions hinders" in the second sentence.

Changed "Incomplete explanations hinder" to "Incompleteness in explanations hinders" in the third sentence.

Chapter 8, Useful Reasoning, last paragraph, footnote, last two sentences

"These students may find decision-oriented interpretations of quantum mechanics to be useful in thinking through the problems of existence and consciousness, e.g., whether a carp that glows in the dark can be said to exist if it only exists in the mind of a geneticist who knows how to make fish that glow in the dark. They may find that quantum mechanics offers deeper insights into the problems of language than early twentieth-century atomic theory offers."

were changed to:

"These students may find that quantum mechanics offers deeper insights into the problems of language than nineteenth-century atomic or biological models offer. For example, they may find decision-oriented interpretations of quantum mechanics to be useful in thinking through the problems of existence and consciousness, e.g., whether a carp that glows in the dark can be said to exist if it only exists in the mind of a geneticist who knows how to make fish that glow in the dark."

Chapter 8, Natural Reasoning, last paragraph, footnote

Changed "boundless approach embraces the whole of experience" to "multiplex approach considers the demand as well as the supply side of pursuing the Truth" in the second sentence.

Appendix A, Producing Ever More Wisely, first paragraph

Changed "view of the multiple-frame model of pursuing Wisdom" to "multiplex view" in the first sentence.

Appendix A, Less is More, last paragraph

"There is a deeper "less is more" story here. It is that ever leaner production leads to ever more complexity in our networks of knowledge-in-use. Just as the motions of a loom weave yarn into cloth, folding and smoothing parts of the line weave knowledge into networks of knowledge-in-use. Regrettably, we do not yet have the concepts we need to think clearly about the structure and dynamics of these networks, which span our nervous systems, our symbolic systems, our organizational systems, and our technological systems. Understanding these networks ought to become as important to people who study people as understanding dark energy and dark matter has become to people who study physics."

was deleted.

Changes in Version 2011.06.20

Chapter 1, Setting Words Aright, fourth paragraph

Changed "to decide well when to decide well is to decide ever more wisely" to "to decide ever more wisely" in the last sentence.

Chapter 2, *Tools for Pursuing Pleasure and Joy*, first paragraph

Changed "helping us choose" to "helping us to choose" in the first sentence.

Chapter 2, Trade, second paragraph

"*Trust promotes creating and using knowledge by lowering the cost of protecting knowledge*. Knowledge assets are harder to protect from theft than are non-knowledge assets. Thieves can easily copy many forms of knowledge, which makes them easy to steal. Stealing knowledge does not prevent its owner from using it, which makes the theft of knowledge easier to hide. The legal recourse for stolen knowledge tends to be more expensive than it is for material resources, where evidence of theft is more clear-cut and the precedents are better established. By lowering the cost of protecting knowledge, trust promotes knowledge."

was changed to:

"Trust promotes creating and using knowledge. Knowledge assets are harder to protect from theft than are non-knowledge assets. Thieves can easily copy many forms of knowledge, which makes them easy to steal. Stealing knowledge does not prevent its owner from using it, which makes the theft of knowledge easier to hide. The legal recourse for stolen knowledge tends to be more expensive than it is for material resources, where evidence of

theft is more clear-cut and the precedents are better established. By lowering the cost of protecting knowledge, trust promotes creating and using knowledge."

Chapter 3, Pursuing the Ring of Truth, second paragraph

Changed "the steps" to "our model" in the first sentence.

Chapter 3, Pursuing the Ring of Truth, last three paragraphs

"Consider how we can use this timeless frame and the invariant concepts of pleasure and joy to define a concept of beauty that is useful in pursuing Wisdom. To yield pleasure, an activity must be neither too easy nor too hard. Too easy an activity bores us; too hard an activity overwhelms us. When the activity is contemplating, the object we contemplate must be neither too simple nor too hard to contemplate. Contemplating too simple an object bores us; contemplating too hard an object overwhelms us. Between these two extremes is a level of difficulty that allows us to lose ourselves in contemplating. As we learn more, objects that once were too hard may yield pleasure; objects that once yielded pleasure may become boring. Learning about classical music may turn Beethoven's symphonies from being overwhelming to being beautiful; it may also change simpler music from being beautiful to being boring.

"To yield joy, an activity must improve our state of being. When the activity is contemplating, the object that we contemplate must be able to improve our state of being. From the multiplex view of the multiple-frame model of pursuing Wisdom, the object we that contemplate must be able to improve how well our beliefs fit together into a coherent whole that we find useful in pursuing Wisdom. For us to be able to learn something useful in pursuing Wisdom from it, it must be just novel enough for us to be able to learn from it. If it is too familiar or too novel, we will not be able to learn from it. As we learn more, objects that once were too novel may become just novel enough to yield joy and objects that were just novel enough may become too familiar to yield joy. Before we learn calculus, Newton's theory of gravity is too novel to yield joy. After we learn calculus, it may yield joy. With use, it becomes just another tool for believing well.

"By putting the timeless frame of pursuing Beauty into the multiple-frame model of pursuing Wisdom, we learn that beauty is the quality of objects whose contemplation yields not only the pleasure that comes from losing ourselves in contemplating, but also the joy that comes from contemplating well. Beauty is the quality of objects whose contemplation yields not only pleasure, but also the joy of becoming wiser."

were changed to:

"Consider how combining the frames for contemplating and living well helps us pursue Wisdom. To yield pleasure, an activity must be neither too easy nor too hard. Too easy an activity bores us; too hard an activity overwhelms us. When the activity is contemplating, the object we contemplate must be neither too simple nor too hard to contemplate. Between these two extremes is a level of difficulty that allows us to lose ourselves in contemplating. As we

learn more, objects that once were too hard may yield pleasure; objects that once yielded pleasure may become boring. Learning about classical music may turn Beethoven's symphonies from being overwhelming to being beautiful; it may also change simpler music from being beautiful to being boring.

"To yield joy, an activity must improve our state of being. When the activity is contemplating, the object that we contemplate must be able to improve how well our beliefs fit together into a coherent whole that is useful in pursuing Wisdom. For this, it must be just novel enough for us to be able to learn from it. If it is too familiar or too novel, we will not be able to learn from it. As we learn more, objects that once were too novel may become just novel enough to yield joy and objects that were just novel enough may become too familiar to yield joy. Before we learn calculus, Newton's theory of gravity is too novel to yield joy. After we learn calculus, it may yield joy. With use, it becomes just another tool for believing well.

"By combining the frames for contemplating and living well, we learn that beauty is the quality of objects whose contemplation yields not only pleasure, but also the joy of becoming wiser."

Chapter 3, *Public Order*, last three paragraphs

"A team taking a biological approach would invent rules for overcoming constraints. For example, they would develop rules for drafting behind one another. Over time, they would invent ever better rules for governing their behavior. An accomplished team taking this approach would resemble a school of fish or a flock of birds.

"A team taking the public approach would distinguish between the tactical end of cycling well based on what they currently know and the strategic end of deciding well. In addressing the tactical problem, the team would choose to make the best use of current resources in addressing the problem of cycling well. In the short run, an accomplished team taking this approach would resemble teams taking engineering or biological approaches.

"In addressing the strategic problem, the team would seek ever better means of replacing non-knowledge resources useful in deciding well with knowledge resources useful in deciding well. Hence, it would consider technological as well as organizational changes. One such change would be the combination of regenerative braking and boosting motors. This combination would allow cyclists to store otherwise wasted energy from cycling downhill to use when cycling uphill. Another such change would be a networked steering control system similar to experimental automated highway control systems that allow cars to travel bumper-to-bumper at high speeds. Such a system would execute tactical moves much more quickly and precisely than people can execute them. The combination of regenerative breaking, boosting motors, and automated steering would quickly lead to the development of a means of transferring power from one bicycle to another. This change would eliminate the need to rotate team members from tiring positions to less tiring positions. It would also allow the team to reduce wind resistance by putting cyclists who ride taller than others near the center

of the pack. In the long run, an accomplished team taking the public approach would resemble a liquid that undergoes phase changes as it becomes ever more fluid."

were changed to:

"A team taking a biological approach would invent ever better rules for overcoming constraints through their experiences and the experiences of others. For example, team members would develop rules for drafting behind one another. An accomplished team taking this approach would resemble a school of fish or a flock of birds.

"A team taking the public approach would distinguish between the tactical end of cycling well based on what they currently know and the strategic end of deciding well. In addressing the tactical problem, the team would choose to make the best use of current resources in addressing the problem of cycling well. In addressing the strategic problem, it would seek ever better means of replacing non-knowledge resources useful in deciding well with knowledge resources useful in deciding well. Hence, it would consider technological as well as organizational changes. One such change would be the combination of regenerative braking and boosting motors. This combination would allow cyclists to store otherwise wasted energy from cycling downhill to use when cycling uphill. Another such change would be a networked steering control system similar to experimental automated highway control systems that allow cars to travel bumper-to-bumper at high speeds. Such a system would execute tactical moves much more quickly and precisely than people can execute them. The combination of regenerative breaking, boosting motors, and automated steering would quickly lead to the development of a means of transferring power from one bicycle to another. This change would eliminate the need to rotate team members from tiring positions to less tiring positions. It would also allow the team to reduce wind resistance by putting cyclists who ride taller than others near the center of the pack. An accomplished team taking this approach would resemble a liquid that undergoes phase changes as it becomes ever more fluid."

Chapter 4, Refining Deciding Well, first paragraph, first two sentences

"The invariant concept of science described above calls for us to refine our beliefs about deciding well. This in turn calls for us to refine the models we use to help us predict how people will decide and the models we use to explain deciding well."

were changed to:

" The invariant concept of science described above calls for us to refine the models we use to help us predict how people will decide and those we use to explain deciding well."

Chapter 4, Refining Deciding Well, fifth paragraph, last sentence

"Deciding well calls for us to learn; it calls for us to leave the caves of our ancestral clans."

was changed to:

" Deciding well calls for us to learn, to leave the caves of our ancestral clans."

Chapter 4, *Learning from Experience*, second paragraph

"Many other trading problems that give rise to uneven flow have yet to be discovered and solved."

was changed to:

"We have yet to discover and solve many other trading problems that give rise to uneven flow."

Chapter 4, *A Crude Look at the Whole*, last paragraph

Changed "remainder is frozen in" to "rest we embed into" in the last sentence.

Removed quotation marks from "frozen" in the last sentence.

Chapter 5, *Promote Savings for Welfare*, last paragraph

"Policymakers might combine (1) a government-run safety-net program; (2) a highly progressive consumption tax system; and (3) a consumption tax-exempt universal welfare savings account program. The safety-net program would ensure that all of us have what we need to pursue Wisdom. The government would tax all income as consumption. The universal welfare savings account would allow tax-free withdrawals for qualified medical, education, and hardship-related expenses for the owners of the account and their dependants. They would also include unlimited giving to private charities.[16] It would treat all other withdrawals as consumption. The haves as well as the have-nots ought to pursue Wisdom.[17]"

"[16] Ideally, private charities would drive the government out of the welfare business. The government safety-net program, like a militia, would remain available for emergencies."

"[17] From the view of modern economics, our interest in how others choose to live is external to the problem of how best to allocate scarce resources. The modern economic solution to this externality problem involves making all information about how we choose to live our lives knowable to all. Compared to the loss of all privacy, the universal welfare savings plan and highly progressive taxation solution does not look so onerous. From the multiplex view, the natural distribution of income of people deciding well is likely to follow an inverse power law. If so, policies for redistributing income will hinder pursuing Wisdom. Far better are policies for promoting pursuing Wisdom."

was merged into the preceding paragraph and changed to:

"How can they promote a culture of Wisdom? They might create a *universal welfare savings account program*, a savings account program that allowed unlimited tax-free savings and tax-free withdrawals for medical, education, charitable, and hardship-related expenses. To this,

they might add a safety net program to ensure that the have-nots have the material resources that they need to pursue Wisdom. They might also add a highly progressive income tax to ensure that the haves have the incentives they need to pursue Wisdom.[16] This combination of policies would create a thriving non-profit sector dedicated to helping people pursue Wisdom.[17]"

"[16] From the view of modern economics, our interest in how others choose to live is external to the problem of how best to allocate scarce resources. The modern economic solution to this externality problem involves making all information about how we choose to live our lives knowable to all. Compared to the loss of all privacy, the universal welfare savings plan and highly progressive taxation solution does not look so onerous. From the multiplex view, the natural distribution of income of people deciding well is likely to follow an inverse power law. If so, policies for redistributing income will hinder deciding well. Far better are policies for ensuring that people have incentives to decide well.

"[17] Ideally, private charities would drive the government out of the welfare business. The government safety-net program, like a militia, would remain available for emergencies."

Appendix A, *A Crude Look at the Whole*, last paragraph

Changed "are so greatly folded in" to "they so greatly fold in" in the second to last sentence.

Changed "are barely folded in" to "they barely fold in" in the last sentence.

Appendix A, Less is More, last paragraph

"There is a deeper "less is more" story here. It is that ever leaner production leads to ever more complexity in our networks of knowledge-in-use. Just as the motions of a loom weave yarn into cloth, folding and smoothing parts of the line weave knowledge into networks of knowledge-in-use. Regrettably, we do not yet have the concepts we need to think clearly about the structure and dynamics of these networks, which span our nervous systems, our symbolic systems, our organizational systems, and our technological systems. Understanding these networks ought to become as important to people who study people as understanding dark energy and dark matter has become to people who study physics."

was returned as a footnote rather than the last paragraph.

Changes in Version 2011.06.24

Acknowledgments, second paragraph

Changed "infintely large problem" to "problem" in the tenth sentence.

Deleted the sixth sentence: "He also introduced me to Thomas Kuhn's philosophy of science."

Preface, first paragraph

Changed "a method" to "an empirical method" in the last sentence.

Preface, second paragraph

Changed "process" to "decision cycle" in the last sentence.

Preface, fourth paragraph

Changed "may use" to "use" in the last sentence.

Preface, fifth paragraph

Changed "process of deciding well" to "recursive process" in the first sentence.

Chapter 1, Setting Words Aright, first paragraph

Changed "ends" to "ends (goals)" in the first sentence.

Chapter 1, Choosing Frames Well, second paragraph

Changed "ends (goals)" to "ends" in the third sentence.

Chapter 1, *The Need for Timeless Frames*, last paragraph

Changed "the frame of modern decision science" to "a temporal frame of deciding well" in the first sentence.

Chapter 1, Temporal versus Invariant Values, fourth paragraph, footnote

"[10] Taking a timeless view of deciding well does not call for us to abandon the study of texts. It only calls for us to interpret texts in the light of pursuing Wisdom. Lovers of Wisdom call this study *hermeneutics*. Note that the change in case from the temporal view third person plural to the timeless view first person plural is not a mistake. As we shall see, we cannot separate the timeless problems we face from the timeless problems all other people face."

was changed to:

"[10] Note that taking a timeless view of deciding well does not call for us to abandon the study of texts. It only calls for us to interpret texts in the light of pursuing Wisdom. Note too that the change in case from the temporal view third person plural to the timeless view first

person plural is not a mistake. As we shall see, we cannot separate the timeless problems we face from the timeless problems all other people face."

Chapter 1, Temporal versus Invariant Values, seventh paragraph

Changed "infinitely large problem" to "problem" in the last sentence.

Chapter 1, Temporal versus Invariant Values, last paragraph

Italicized "*does not*" to in the first sentence.

Italicized "*does*" to in the second sentence.

Chapter 1, *Steps for Building Multiple-Frame Models*, fourth paragraph

Changed "The addition of" to "Adding" in the first sentence.

Chapter 1, *Steps for Building Multiple-Frame Models*, last paragraph

Changed "to better integrate" to "better integrate" in the last sentence.

Chapter 1, *Ever More Complete Multiple-Frame Models*, last paragraph

Changed "to form and judge decision-rules, or to form and judge habits" to "use decision-rules, or use discipline" in the second sentence.

Changed "creating knowledge through failure" to "learning by doing" in the last sentence.

Chapter 2, Invariant Tools for Living Well, last paragraph

Changed "this chapter" to "the rest of this chapter" and "the *temporal view*" to "*the temporal view*" in the third sentence.

Changed "the remainder of this work" to "the rest of this work" and "the *multiplex view*" to "*the multiplex view*" in the last sentence.

Changed "theists may call "a God's eye view"" to "monotheists may call *a God's eye view*" in the third sentence of the footnote.

Chapter 6, *Einstein's Twin Warnings*, last paragraph

Added the sentence:

"Note that what Einstein calls science is modern science, not invariant science."

Chapter 7, The Scope of Competing Well, first paragraph, last two sentences

"Because none of us is perfectly wise, we not only disagree about these beliefs, but also about beliefs of all kinds. To settle these disagreements ever more wisely, we need a recursive process that concerns how to settle disagreements ever more wisely. We may call this recursive process *competing well* and the timeless end of this process *Winning*."

were changed to:

"Because none of us is perfectly wise, we not only dispute these beliefs, but also beliefs of all kinds. We may call the process of settling disputes ever more wisely *competing well* and the timeless end of this process *Winning*."

Chapter 7, The Scope of Strategy, last paragraph

Changed "F-18" to "F/A-18" in the last sentence.

Chapter 7, *The Grandest Possible Strategy*, last paragraph, last two sentences

"*Adopting this strategy calls for making the national goal pursuing Wisdom.* In the words of Abraham Lincoln, "Let us have faith that right makes might, and in that faith, let us, to the end, dare to do our duty as we understand it."[17]"

"[17] This public profession was the culmination of Lincoln's address at The Cooper Union for the Advancement of Science and Art (New York City, 27 Feb. 1860)."

were changed to:

"This strategy calls for making our national goal pursuing Wisdom; for making our sovereign rights story the story of pursuing Wisdom; and for keeping Lincoln's faith that right makes might.[17]"

"[17] In the words of Abraham Lincoln at The Cooper Union for the Advancement of Science and Art on February 27, 1860, "Let us have faith that right makes might, and in that faith, let us, to the end, dare to do our duty as we understand it.""

Chapter 8, Useful Reasoning, second paragraph

Changed "the *rules*" to "*the rules*" in the last sentence.

Chapter 8, Useful Reasoning, third paragraph

Changed "the *rules*" to "*the rules*" in the last sentence.

Chapter 8, Useful Reasoning, last paragraph

Changed "the *rules*" to "*the rules*" in the last sentence.

Chapter 8, Useful Reasoning, last paragraph, footnote

Changed "everyday thinking" to "modern everyday thinking" in the first sentence.

Changes in Version 2011.06.28

The following changes were prompted by an edit of the 14 June 2011 version by Sally Osborn. Some punctuation changes in footnotes are not included.

Acknowledgments, fourth paragraph

Changed "learning" to "learning itself" in the last sentence.

Preface, third paragraph

Changed "the better we decide the more tightly" to "the better we decide, the more tightly" in the all (2 occurrences).

Preface, fourth paragraph

Changed "build" to "construct" and "that we know" to "we know" in the second sentence.

Changed "ring" to "rings" in the fifth sentence.

Changed "After we have chosen a problem to solve, we use" to "We then use" in the last sentence.

Preface, tenth paragraph

Changed "that we use" to "we use" in the first sentence.

Chapter 1, Setting Words Aright, fourth paragraph

Changed "99" to "9" in the first footnote.

Italicized "*Journal of Personality*" in the second footnote.

Chapter 1, Choosing Frames Well, second paragraph

Changed "affects" to "affect" in the first sentence.

Chapter 1, Choosing Frames Well, third paragraph

Changed "to deliberate, use decision rules, or use discipline" to "use deliberation, decision rules, or discipline" in the first sentence.

Chapter 1, Choosing Frames Well, last paragraph, last six sentences

"To choose this frame, we must choose a frame. To choose this frame, we must choose a frame. And so on to infinity. We cannot solve this infinitely large problem. However, we can address it by making it part of the problem of deciding well. In other words, we can address the problem of choosing frames well and the problem of deciding well holistically."

were changed to:

"To choose this frame, we must choose a frame from within which to choose. To choose this frame, we must choose a frame from within which to choose. And so on to infinity. We cannot solve this infinitely large problem. However, we can address it by making it part of the problem of deciding well."

Chapter 1, Choosing Frames Well, first paragraph

Changed "deciding well holistically" to "choosing frames well by deciding well" in the first sentence.

Chapter 1, *The EOQ/RTS Example*, sixth paragraph

Changed "that American firms did" to "as American firms" in the fourth sentence.

Chapter 1, *The EOQ/RTS Example*, last paragraph, footnote

Changed "appendix" to "Appendix" in the first sentence.

Chapter 1, *The Need for Timeless Frames*, first paragraph

Changed "people locked" back to "people who are locked" in the first sentence.

Chapter 1, Temporal versus Invariant Values, sixth paragraph, fifth through seventh sentences

"Confronted with the new condition of having something other than "liquid water that falls from the sky" make the ground wet, the villagers face a choice. Do they continue to use 'rain' to denote "the source of water that makes the ground wet"? Or do they choose to use 'rain' to denote "liquid water that falls from the sky"?"

were changed to:

"Confronted with a new cause of wet ground, the villagers face a choice. They may choose to continue to use 'rain' to denote "the source of water that makes the ground wet." Alternatively, they may choose to use 'rain' to denote "liquid water that falls from the sky.""

Chapter 1, *Ever More Complete Multiple-Frame Models*, fifth paragraph

Changed "to what end" to "what end" in the sixth sentence.

Chapter 1, *Ever More Complete Multiple-Frame Models*, last paragraph

Deleted the sentence: "This is true whether we use it to deliberate, use decision-rules, or use discipline."

Added the sentence: "Like the Toyota system, it helps us break down overwhelmingly complex problems into problems we can solve."

Chapter 2, *Pleasure and Pain*, first paragraph

Changed "cannot" to "we cannot" in the second sentence.

Chapter 2, Trade, second paragraph

Changed "Hollywood and the Silicon Valley" to "the Silicon Valley" in the last sentence.

Chapter 2, Profit, first paragraph, footnote

Changed "use knowledge" to "use of knowledge" in the first sentence.

Chapter 3, *Public Order*, second paragraph

Changed "From biological view" to "From the biological view" in the last sentence.

Chapter 3, *Public Order*, fifth paragraph

Changed "problem" to "the problem" in the second sentence.

Chapter 3, *Zero Public Entropy*, third paragraph

Changed "studying" to "contemplating" in the first sentence.

Changed "signal that is" to "signal that it is" in the sixth sentence.

Changed "appendix" to "Appendix" in the first sentence of the footnote.

Chapter 3, *Decision-Oriented Interpretations of Quantum Mechanics*, first paragraph

Changed "studying" to "contemplating" in the first sentence.

Changed "studying" to "thinking about" in the second sentence.

Chapter 3, *Decision-Oriented Interpretations of Quantum Mechanics*, second paragraph

Changed "common sense beliefs" to "common-sense beliefs" in the fourth sentence.

Chapter 3, The Elephant in the Room, first paragraph

Changed "multiple-frame model of pursuing Wisdom" to "multiple-frame model" in the first sentence.

Chapter 3, The Elephant in the Room, last paragraph

Changed "to solve the essential process" to "to solve, the essential process" in the second sentence.

Chapter 4, The Elephant in the Room, fourth paragraph

Changed "as people" to "as people," in the fourth sentence.

Changed "descendents" to "descendants" in the last sentence of the first footnote.

Chapter 4, *A Crude Look at the Whole*, first paragraph, last footnote

Changed "is" to "are" in the first sentence.

Changed "may quickly be followed by" to "may follow" in the fourth sentence.

Changed "a political turbulence in the form of a revolution or war" to "a war" in the fifth sentence.

Changed "Benoit" to "Benoît" in the last sentence.

Chapter 5, Good Policies, first paragraph, footnote

Changed "530" to "30" in the last sentence.

Chapter 5, *Promote pursuing Wisdom, not Temporal Order*, second paragraph, last sentence

"These mistakes include such things as financial products that look good in the short run but are likely to fail in the long run; the proliferation of models for pricing financial assets that presume periods of great turbulence are rare; and a regulatory environment that favors the temporal values of economic growth and stability over Wisdom, hence over the Good, the Truth, Justice, Wholeness, and all of the other boundless factors of pursuing Wisdom."

was changed to:

"These mistakes include such things as financial products that look good in the short run but are likely to fail in the long run; the proliferation of models for pricing financial assets that presume that periods of great turbulence are rare; and a regulatory environment that favors the temporal values of economic growth and stability over the invariant value of Wisdom, hence over the invariant values of the Good, the Truth, Justice, Wholeness, and all of the other boundless factors of pursuing Wisdom."

Chapter 5, Liberalism, second paragraph

Changed "American" to "modern American" in the first sentence.

Chapter 5, Liberalism, third paragraph

Changed "debts that we owe" to "debts we owe" in the second sentence.

Chapter 6, *Worldly Benefits of Detachment*, last paragraph

Changed "to conceive" to "conceive" in the last sentence.

Chapter 6, Experiencing the Mysterious, first paragraph, footnote

Changed "194" to "4" in the first sentence.

Chapter 6, *Einstein's Twin Warnings*, last paragraph

Changed "twin warnings," to "twin warnings:" in the last sentence.

Chapter 7, The Scope of Game Theory, first paragraph, fifth and sixth sentences

"If eleven people cooperate and nine people defect; then the cooperators will each get $30 (10 x $3 + 9 x $0) and the defectors will each get $63 (11 x $5 + 8 x $1). He told them that defectors would always receive at least as much money as everyone else (hence would never be a "loser"), but that they should aim at getting as much money as possible rather than to be a "winner.""

were changed to:

"If eleven people cooperated and nine people defected; then the cooperators would each get $30 (10 x $3 + 9 x $0) and the defectors would each get $63 (11 x $5 + 8 x $1). He told them that defectors would always receive at least as much money as everyone else (hence would never be a "loser"), but that they should aim at getting as much money as possible rather than being a "winner.""

Chapter 7, The Scope of Game Theory, third paragraph

Changed "were six people" to "were that six people" in the first sentence.

Chapter 7, The Scope of Game Theory, fourth paragraph

Changed "by announcing" to "by announcing:" in the third sentence.

Chapter 7, *A Classic Anomaly*, second paragraph

Deleted "either with the same players or with players who are able to learn from the experience of other players" from the sixth sentence.

Chapter 7, *A Greater Anomaly*, first paragraph

Changed "hint of" to "hint at" in the first sentence.

Chapter 7, *A Greater Anomaly*, second paragraph

Changed "maxim," to "maxim:" in the fourteenth sentence.

Chapter 7, The Scope of Strategy, third paragraph

Changed "their design" to "its design" in the sixth sentence.

Chapter 7, *Temporal OODA Loop Analysis*, first paragraph

Changed "fit" to "fitted" in the last sentence.

Chapter 7, *Boyd's Grand Strategy*, first paragraph, second footnote

Changed "recursive process" to "a recursive process" in the last sentence.

Chapter 8, Natural Reasoning, first paragraph

Changed "win-win" to "win–win" in the second sentence.

Changed "best use knowledge" to "best use of knowledge" in the fourth sentence.

Chapter 8, Natural Reasoning, second paragraph, footnote

Changed "Benoit" to "Benoît" in the second sentence.

Appendix, Folding in Processes, fourth paragraph

Changed "greater the relative benefits of folding in are" to "greater are the relative benefits of folding in" in the seventh sentence.

Changes in Version 2011.06.30

Preface, second to last paragraph, end

Added the sentence:

"Deciding well quickens the pace of change, which increases the need for deciding well."

Chapter 1, Choosing Frames Well, first paragraph

Changed "structures" to "useful structures" in the last sentence.

Chapter 1, *The EOQ/RTS Example*, last paragraph

Changed "*good products*" to "*products*" in the fifth sentence.

Chapter 1, *Steps for Building Multiple-Frame Models*, fourth paragraph, last three sentences

"The better we pursue Wisdom and pursue the Truth, the more tightly the pursuits of Wisdom and the Truth intertwine. If we pursued both of these timeless ends perfectly, the pursuit of the Truth and the pursuit of Wisdom would be the same pursuit. Because we do not pursue these timeless ends perfectly, it useful for us to think of them as separate pursuits, each subject to its own set of problems. Because we do not pursue these timeless ends perfectly, it useful for us to think of them as separate pursuits, each subject to its own set of problems."

was made into a new paragraph and changed to:

"The better we pursue Wisdom and pursue the Truth, the more tightly these two pursuits intertwine. If we pursued both of these timeless ends perfectly, they would be the same pursuit. Regrettably, we lack the knowledge to pursue them perfectly. This includes the knowledge of how to think clearly across frames. Because we lack the knowledge of how to think clearly across frames, it useful for us to think of pursuing Wisdom and the Truth as separate pursuits, each subject to its own set of problems."

Chapter 1, *Steps for Building Multiple-Frame Models*, last paragraph

"The technique of reducing complex wholes to multiple frames opens more of our ability to recognize patterns to reason, thereby helping us better integrate these two abilities."

was changed to:

"It allows us to think about complex phenomena more clearly.[12]"

"[12] The technique of reducing complex wholes to multiple frames opens more of our ability to recognize patterns to logic, thereby helping us better integrate these two abilities."

Chapter 2, A Strategy for Learning Well, first paragraph

Changed "pursuing Wisdom using" to "deciding well using" in the last sentence.

Chapter 3, Pursuing the Ring of Truth, first paragraph

Changed "Pursuing Wisdom using" to "Deciding well using" in the first sentence.

Chapter 3, Three Approaches to Policy, last paragraph

Changed "pursuing Wisdom using" to "deciding well using" in the fourth sentence.

Chapter 3, The Elephant in the Room, first paragraph

Changed "pursuing Wisdom using" to "deciding well using" in the first sentence.

Chapter 3, *Decision-Oriented Interpretations of Quantum Mechanics*, third paragraph

Changed "categories" to "classes" in the second sentence.

Changed "*interpretation* category" to "*class*" in all (3 occurrences).

Chapter 3, *Decision-Oriented Interpretations of Quantum Mechanics*, last paragraph

Changed "category" to "class" in the first sentence.

Changed "to be possible states-of-the-world" to "exist" in the second sentence.

Changed "*the decision* category" to "the *decision class*" in the last sentence.

Chapter 3, *A Decision-Tree Interpretation of Quantum Mechanics*, last paragraph

Changed "category" to "class" in the first sentence.

Changed "pubic problem" to "problem" in the fourth sentence.

Chapter 4, Refining Everyday Thinking, fifth sentence, footnote

"[2] Strictly speaking, we do not weed out these stories. We weed out applications of these stories. Corn in a cornfield is a crop. Corn in a beanfield is a weed."

was changed to:

"[2] Note that we judge the usefulness of these description within bounds. Newtonian mechanics is good for predicting the behavior of large items moving at low speeds, but poor at predicting either the behavior of very small objects or the behavior of objects moving at very high speeds. Also note that descriptions of the world may have their own logic. A classic example is quantum mechanics, which includes such apparently strange behavior as objects that must rotate 360 degrees *twice* to return to their initial state."

Chapter 4, *A Crude Look at the Whole*, first paragraph, last footnote, second through fifth sentences

"We may speculate that the releases of large amount of stress are, in part, cyclical. It takes time to accumulate enough stress to cause a major catastrophe. However, it is also clear that a major release of stress in one area may follow a major release of stress in another area. For example, a war may follow a major financial collapse."

were changed to:

"We may speculate that the "roughness" of economic flows relative to the speed of progress varies inversely with the quality of decision-making."

Chapter 5, *The Explicit Experiment*, last paragraph, footnote, second through fifth sentences

"In a case challenging whether the federal government could take away not only local butchers' freedom to choose the price of the chickens they offered and what wages they paid their workers, but also their customers' freedom to choose which chickens to buy (A. L. A. Schecter Poultry Corporation v. United States, 295 U. S. 495), the Supreme Court struck down Title I of this act in 1935. This was in time to prevent the country from following the Russian Empire into international socialism, or Italy and Germany into national socialism."

was changed to:

"In 1935, the Supreme court struck down Title I of this act (A. L. A. Schecter Poultry Corporation v. United States, 295 U. S. 495), thereby preventing the United States from following Italy and Germany into national socialism."

Chapter 5, Liberalism, last paragraph

Changed "pursuing Wisdom using" to "deciding well using" in the last sentence.

Chapter 6, A Common Timeless End, last paragraph

Changed "pursuing Wisdom using" to "deciding well using" in the first and third sentences (2 occurrences).

Chapter 7, *A Classic Anomaly*, title

Changed "*Classic*" to "*Temporal*."

Chapter 7, *A Greater Anomaly*, title

Changed "*Greater*" to "*Timeless*."

Chapter 7, *A Timeless Anomaly*, first paragraph

Changed "modern models for thinking clearly" to "current models of reasoning well" in the second sentence.

Changed "It" to "From the view of modern philosophy, it" in the last sentence.

Chapter 7, *A Timeless Anomaly*, second paragraph, first sentence

"The multiple-frame model of addresses this anomaly."

was changed to:

"From the multiplex view, playing games well calls for a grander concept of reason than either logic or dialectics."

Chapter 7, *A Timeless Anomaly*, second paragraph, last sentence

"The problem of pursuing Wisdom is the same for all of us."

was changed to:

"Pursuing Wisdom calls for us to consider the symmetry of pursuing Wisdom before choosing a strategy. It calls for a grander concept of reason, a concept of reason in which all problems are part of the problem that contains all problems. People who base their decisions on temporal values, values based on the false belief that it is possible to separate problems from the problem that contains all other problems, act irrationally."

Chapter 7, *A Timeless Anomaly*, last paragraph

"From the multiplex view, the end of competing well is Winning. Pursuing this timeless end well calls for winning over competitors to pursuing Wisdom. Adapting to an ever-increasing pace of change well calls for pursuing Wisdom."

was deleted.

Chapter 7, The Scope of Strategy, first paragraph

"The most important development in strategic thinking in the second half of the twentieth century was the idea of competing well by deciding well ever more quickly. The person most responsible for this idea was John Boyd."

was changed to:

"To compete well, we need to consider the spatial boundaries that define the field. In the game of Reversi (Othello), the boundaries protect the corner positions from attack. In the battle of Thermopylae, the boundaries defined by the Athenian-controlled Gulf of Malia and the shoreline cliffs protected the Spartans and their allies from attack from the north and south.

"To compete well, we also need to consider the temporal boundaries that define the field. The most important development in strategic thinking in the second half of the twentieth century was the idea of competing well by deciding well ever more quickly. The person most responsible for this idea was John Boyd.

"***E–M Theory***"

Chapter 7, *Timeless OODA Loop Analysis*, last paragraph

Changed "wrote of his contribution," to "wrote of his contribution:" in the second sentence.

Chapter 7, *The Grandest Possible Strategy*, first two paragraphs

"To compete well, we need to consider the spatial boundaries that define the field. In the game of Reversi (Othello), the boundaries protect the corner positions from attack. In the battle of Thermopylae, the boundaries defined by the Athenian-controlled Gulf of Malia and the shoreline cliffs protected the Spartans and their allies from attack from the north and south.

"To compete well, we also need to consider the temporal boundaries that define the field. As John Boyd has shown us, people who are able to decide well more quickly can prevail by getting inside their adversaries' decision cycles."

were deleted.

Chapter 8, Useful Reasoning, fourth paragraph

Changed "pursuing Wisdom using" to "deciding well using" in the last sentence.

Chapter 8, Useful Reasoning, last paragraph

Changed "pursuing Wisdom using" to "deciding well using" and "the pursuit of all boundless factors of pursuing Wisdom, which are timeless ends" to "pursuing all boundless factors of pursuing Wisdom" in the first sentence.

Changed "pursuing Wisdom using" to "deciding well using" in the fourth sentence.

Chapter 8, Natural Reasoning, last paragraph

Changed "pursuing Wisdom" to "deciding well" in the last sentence.

Changed "the demand as well as the supply" to "more of the demand" in the second sentence of the footnote.

Changed "incompleteness" to "relative incompleteness" in the third sentence of the footnote.

Changes in Version 2011.07.12

Chapter 1, *Steps for Building Multiple-Frame Models*, third paragraph, first two sentences

"The tautological way in which we define the timeless end of pursuing Wisdom makes this single-frame model useless as a tool for helping us find problems to solve in pursuing Wisdom. To make this model useful in finding problems to solve in pursuing Wisdom, we need to add frames to it."

were changed to:

"The tautological way in which we define the timeless end of pursuing Wisdom makes this single-frame model useless as a tool for helping us find problems to solve in pursuing Wisdom that involve changing our concept of Wisdom. To make this model useful in finding problems to solve in pursuing Wisdom that involve changing our concept of Wisdom, we need to add frames to it."

Chapter 2, Invariant Tools for Deciding Well, last paragraph, footnote

Changed "trancendental-multiplex mental" to "transcendental" in the third sentence.

Chapter 2, Consumption, second paragraph

Changed "difference between pleasure and joy" to "roles of pleasure and pain in living well" in the last sentence.

Chapter 2, *Pleasure and Pain*, third paragraph

"Finding pleasure in an activity can improve the performance of that activity. Losing ourselves in thinking can help us think better. Our ability to think clearly usually suffers when something painful, such as a headache, hinders us from losing ourselves in thinking. Similarly, losing ourselves in a sporting activity helps us perform better. We usually perform

less well when something painful, such as a sore shoulder, hinders us from losing ourselves in sport."

was changed to:

"Finding pleasure in an activity can improve the performance of that activity. Losing ourselves sporting activity helps us perform better. We usually perform less well when something painful, such as a sore shoulder, hinders us from losing ourselves in sport. Similarly, losing ourselves in a in thinking can help us think better. Our ability to think clearly usually suffers when something painful, such as a headache, hinders us from losing ourselves in thinking."

Chapter 3, The Elephant in the Room, third paragraph

Changed "Divine" to "Creator" in the second sentence.

Chapter 4, *A Crude Look at the Whole*, last paragraph, fifth sentence

"Though largely hidden from current view, these embedded mistakes both retard progress toward Wisdom and increase the probability of civilization-threatening catastrophes."

was changed to:

"These embedded mistakes both retard progress and increase the probability of catastrophes."

Chapter 7, *E–M Theory*, last paragraph

Changed "close-in tactics" to "air forces" in the fourth sentence.

Chapter 7, *The Grandest Possible Strategy*, last paragraph

Changed "Lincoln's" to "Abraham Lincoln's" in the last sentence.

Changes in Version 2011.07.16

Preface, fourth to last paragraph

Changed "Albert Einstein's source" to "what Albert Einstein believed stands at the cradle" in the last sentence.

Chapter 1, Setting Words Aright, fourth paragraph

Changed "to decide ever more wisely" to "decide well when to decide well is to learn to decide ever more wisely" in the last sentence.

Chapter 2, Invariant Tools for Living Well, last paragraph

Changed "The rest of this chapter" to "This chapter" in the second sentence.

Changed "work" to "book" in the last sentence.

Changed "pursuing Wisdom" to "deciding well" in the second to last sentence of the footnote.

Inserted a paragraph break between the second and third sentences.

Chapter 3, *Zero Public Entropy*, second paragraph

Changed "particle" to "object" in the last sentence.

Chapter 7, *A Temporal Anomaly*, second paragraph, last five sentences

"The first is that the situation occurs only once. This temporal assumption yields models that effectively prohibit learning by doing. The second is that the same situation occurs repeatedly. This timeless assumption yields models bounded by circumstance, but not by time. In effect, these models are symmetric with respect to time. These two simplifying assumptions divide game theory into temporal and timeless categories."

were changed to:

"The first is that the game occurs only once. This yields temporal models. The second is that the same game occurs repeatedly. This yields timeless models that are symmetric in a way that we can use the knowledge that we learn from each game."

Chapter 7, *A Temporal Anomaly*, last paragraph, first five sentences

"Hofstadter created a clever anomaly to modern game theory by creating a symmetrical model that prohibits learning. The multiple-player nature of his game creates symmetry. The one-time nature of his game prohibits learning. In doing so, he built a model that does not fit neatly into either the temporal or the timeless categories."

were changed to:

"Hofstadter created a clever anomaly to modern game theory by creating a temporal model that is symmetric in a way that we cannot use the knowledge that we learn from each game. In doing so, he built a model that does not fit neatly into modern game theory."

Chapter 7, *The Grandest Possible Strategy*, last paragraph

Changed semicolons to commas in the last sentence.

Changes in Version 2011.07.20

Preface, fourth paragraph

Changed "then use" to "can then use" in the last sentence.

Chapter 3, *Decision-Oriented Interpretations of Quantum Mechanics*, first paragraph

Changed "everyday life" to "deciding well" in the last sentence.

Chapter 3, *A Decision-Tree Interpretation of Quantum Mechanics*, second paragraph

Changed "find and solve problems in pursuing Wisdom" to "decide well" in the last sentence.

Chapter 3, *A Decision-Tree Interpretation of Quantum Mechanics*, last paragraph, end

Added the sentence:

"It is the solution that rings true with the most of what we currently know."

Chapter 3, *A Decision-Tree Interpretation of Quantum Mechanics*, last paragraph, end

Added the sentence:

"It is the solution that rings true with the most of what we currently know."

Chapter 7, *A Temporal Anomaly*, title

Changed title to "*A Normal Anomaly*."

Chapter 7, *A Normal Anomaly*, last paragraph

Changed "cracks" to "cracks of game theory" in the second sentence.

Deleted the last sentence:

"For nearly thirty years, true believers in modern game theory have ignored his conclusion that what he calls *superrational* societies, societies in which people compete well by considering symmetry before choosing a strategy, will do better than rational societies.[8]"

"[8] *Metamagical Themas*, p. 764."

Chapter 7, *A Timeless Anomaly*, title

Changed title to "*A Revolutionary Anomaly*."

Chapter 7, *A Revolutionary Anomaly*, first paragraph, first sentence

"Martin Gardner's inability to think about Hofstadter's game rationally and Hofstadter's claim that his game shows the superiority of what he calls superrational societies hint at a far greater anomaly."

was changed to:

"Martin Gardner's inability to think about Hofstadter's game rationally and Hofstadter's claim that his game shows the superiority of what he calls *superrational societies*, societies in which people compete well by considering symmetry before choosing a strategy,[8] hint at a far greater anomaly."

"[8] *Metamagical Themas*, p. 764."

Chapter 8, Useful Reasoning, last paragraph, footnote

Changed "modern everyday thinking" to "a modern concept of everyday thinking" in the first sentence.

Changes in Version 2011.07.22

Chapter 1, *The EOQ/RTS Example*, last paragraph

Changed "*efficiently and effectively*" to "*wisely*" in the last sentence.

Chapter 3, *Decision-Oriented Interpretations of Quantum Mechanics*, first paragraph

Changed "everyday life" to "pursuing Wisdom" in the last sentence.

Chapter 3, *A Decision-Tree Interpretation of Quantum Mechanics*, second paragraph

Changed "find and solve problems in pursuing Wisdom" to "decide well" in the last sentence.

Chapter 3, *A Decision-Tree Interpretation of Quantum Mechanics*, last paragraph, end

Added the sentence:

"It rings true with more of what we currently believe we know."

Chapter 4, Refining Everyday Thinking, last paragraph, footnote, last five sentences

"On a deeper level, 'reflexive' implies that our thoughts about the world are not part of the world. This is consistent with the atomistic thinking of Ludwig Wittgenstein. In contrast, 'recursive' implies that our thoughts about the world are part of the world. This is consistent with the decision-tree interpretation of quantum mechanics. For more on this, read the last chapter."

were deleted from the online version. (They were never added to the PDF version.)

Chapter 4, *Two Types of Ignorance*, last paragraph, end

Added the sentence:

"More than one explanation can fit what we can sense. We ought to choose the explanation that best helps us pursue Wisdom.[5]"

"[5] In philosophical terms, facts are theory-laden and theories that we use to explain are underdetermined by facts. In choosing problems to solve, we ought to choose the theory that both fits the facts and best helps us pursue Wisdom."

Chapter 4, *Academic Fields*, fourth paragraph, end

Added the sentence:

"For example, it would not exclude consciousness from the study of quantum mechanics."

Chapter 4, *A Crude Look at the Whole*, last paragraph

Changed "People" to "We" in the last sentence.

Changes in Version 2011.07.25

Preface, eighth paragraph

"In the chapter titled "Contemplating Well," I explore the role of constraints in deciding well. This yields a number of unexpected tools. Notable among these "surprises" are a dynamic alternative to Pareto optimality and a decision-tree interpretation of quantum mechanics."

was changed to:

"In the chapter titled "Contemplating Well," I explore the role of constraints in deciding well. In the movie based on Carl Sagan's novel, *Contact*, the person who discovered the primer for the alien plans for a transport device explained the key insight that led to this discovery: "An alien intelligence is going to be more advanced. That means efficiency functioning on multiple levels and in multiple dimensions." The key to understanding the role of constraints in this work is a new concept of excellence in means, a concept that calls for efficiency on all levels in all frames of deciding well. Lovers of wisdom may find in this concept a tool for describing the ideal path toward all that is wise, hence toward all that is good, beautiful, true, and just."

Preface, second to last paragraph

Changed "temporal view of the world" to "view of the world based on what they currently know rather than on what they need to know in order to decide well" in the last sentence.

Chapter 1, Invariant Tools for Deciding Well, last paragraph, footnote

Changed "Mandevillian work" to "work" in the third sentence.

Chapter 3, Leaving Behind Modern Explanations, fourth paragraph

"Complete knowledge of some recursive objects will always transcend our knowledge of them. The best we can do is to find a recursive process that will yield ever better approximations of these objects. The mathematical constant π is one such object. We can define π exactly (as the ratio of the circumference to the diameter of a Euclidean circle), but can never know it completely. In mathematical terms, we can never reduce this number to an algebraic expression. Wisdom is another such object. We can define Wisdom exactly (as knowledge that allows a being to decide perfectly), but we can never know it completely. In terms of this work, we can never reduce this object to a logical expression."

was changed to:

"Complete knowledge of some recursive objects will always transcend our knowledge of them. We can never know these objects completely. The best we can do is to find a recursive process that will yield ever better approximations of them. The mathematical constant π is one such object. We can define π exactly (as the ratio of the circumference to the diameter of a Euclidean circle), but can never reduce π to an algebraic expression. Wisdom is another such object. We can define Wisdom exactly (as knowledge that allows a being to decide perfectly), but we can never reduce Wisdom to a logical expression."

Chapter 3, *Public Order*, fourth paragraph

Changed "three meters" to "two meters" in the last sentence.

Chapter 4, *Metascience*, first paragraph, footnote

Changed "longer view" to "more complete view" in the last sentence.

Chapter 4, *Two Types of Ignorance*, last paragraph, footnote

Changed "the facts" to "what we can sense" in the last sentence.

Chapter 7, *The Grandest Possible Strategy*, first paragraph

Changed "must not neglect" to "need" in the first sentence.

Appendix, *Production Links*, last paragraph, last three sentences

"If the team cannot find a readily solvable problem, it tries to balance the line by shifting processes from one work center to another. If the team cannot do this, it adds a kanban pair (P- and C-kanban) to the link. Adding kanban adds to the WIP buffer between the supplying and consuming work centers."

were deleted.

Changes in Version 2011.07.30

Preface, eighth paragraph, second through fifth sentences

"In the movie based on Carl Sagan's novel, *Contact*, the person who discovered the primer for the alien plans for a transport device explained the key insight that led to this discovery: "An alien intelligence is going to be more advanced. That means efficiency functioning on multiple levels and in multiple dimensions." The key to understanding the role of constraints in this work is a new concept of excellence in means, a concept that calls for efficiency on all levels in all frames of deciding well."

were changed to:

"The key to understanding this role is a new concept of excellence in means, a concept that calls for efficiency on all levels in all frames of deciding well."

Chapter 4, *Metascience*, entire subsection

"***Metascience***
From a modern view of believing well, science concerns what the producers of knowledge are able to supply under current constraints. In contrast, from the multiplex view, science concerns not only what we are able to supply under current constraints, but also what we need to decide well.[4]

"The essential process of deciding well consists of models that we use to choose solutions to temporal problems and models that we use to choose temporal problems, timeless problems, and the means for choosing problems. We may call the models that we use to choose problems *metascientific models*.

"Metascientific models are part of science. We not only test these models through experience, but also base them on experience:

Consider the process of pursuing a timeless end. Within the frame of pursuing this end, we define the timeless end and the means of pursuing this timeless end tautologically. This tautology tells us nothing about either the timeless end or the means to it.

Now consider the proposition that it is only from experience that we learn. From within the frame of pursuing a timeless end, it is only from the experience of overcoming the constraints that hinder us in pursing the timeless end that we learn more of the timeless end. For example, from within the frame of pursuing the Good, it is only from the experience of overcoming some hunger that we learn of the greater good that results from overcoming this hunger. Similarly, from within the frame of pursuing the Truth, it is only from the experience of overcoming some ignorance that we learn of the greater truth that results from overcoming this ignorance.

Next, consider how this applies to pursuing Wisdom. From within the frame of pursuing Wisdom, it is only from experience in overcoming some foolishness that we learn of the greater wisdom that results from overcoming this foolishness. However, when this foolishness is what hinders us from seeing the relations between the boundless factors of pursuing Wisdom, we learn that we can learn something of one boundless factor of pursuing Wisdom by overcoming the constraints that hinder us from pursuing another boundless factor of pursuing Wisdom. For example, overcoming a constraint that hinders us from pursuing the Good, say the need for acceptance by what we currently believe to be members of our society, can help us learn more about the Truth.

From within the frame of pursuing the Truth, learning something from other than the experience of overcoming a constraint that *directly* hinders us from pursuing the Truth may appear to be learning something from other than experience. From the multiplex view, the cause of this false appearance lies in failing to recognize that pursuing the Truth calls for us to pursue Wisdom. Anything that hinders us from pursuing Wisdom also hinders us from pursuing the Truth.

"*Invariant science contains its own metascience.*"

"[4] In modern economic terms, the argument for a holistic approach to believing well put forth in this work concerns the demand as well as the supply side of believing well. Readers looking for supply-side arguments for a holistic approach to believing would do well to start with W. V. O. Quine's "Two Dogmas of Empiricism.""

was deleted.

Chapter 4, Two Types of Ignorance, last paragraph, footnote

Deleted the last sentence: "In choosing problems to solve, we ought to choose the theory that both fits what we can sense and best helps us pursue Wisdom."

Moved footnote forward one sentence.

Chapter 4, Two Types of Ignorance, last paragraph, end

Added the footnote:

"[5] In complexity science terms, invariant science is a self-similar, self-referential process that lies between what we may call *positive science* (the set of knowledge that helps us predict well but helps us explain nothing) and what we may call *metaphysics* (the set of models that transcends everyday thinking). Within this process, we may call the set of models that we use to help us predict well *true science* and the set of models that we use to explain well *metascience*. Only true science models can be both logically consistent and complete."

Chapter 6, A Common Timeless End, last paragraph

"From a materialist view of deciding well using the multiple-frame model of pursuing Wisdom, Wholeness is subordinate to the Good: we become part of something infinitely larger than ourselves in order to live well. From a dualist view of deciding well using the multiple-frame model of pursuing Wisdom, the Good is subordinate to Wholeness: we live well in order to become part of something infinitely larger than ourselves. Which of these views is true currently is a matter of faith, a matter of belief beyond reason. From both types of multiplex views, Wholeness is a boundless factor of pursuing Wisdom: pursuing Wisdom calls for us to pursue Wholeness and pursuing Wholeness calls for us to pursue Wisdom. The lack of resources for pursuing Wisdom may cause us to choose between pursuing the Good and pursuing Wholeness. Pursuing Wisdom makes it ever less likely that we will need to make this choice."

was changed to:

"From a materialist view of deciding well using the multiple-frame model of pursuing Wisdom, we become part of something infinitely larger than ourselves in order to live well. *Wholeness is subordinate to the Good.* From a dualist view of deciding well using the multiple-frame model of pursuing Wisdom, we live well in order to become part of something infinitely larger than ourselves. *The Good is subordinate to Wholeness.* Which of these views is true currently is a matter of faith, a matter of belief beyond reason. From both types of views, poverty may force us to choose between pursuing the Good and pursuing Wholeness. *Pursuing Wisdom makes it ever less likely that we will need to make this choice.*"

Chapter 8, Useful Reasoning, first five paragraphs

"Pursuing ends well calls for us to overcome our ignorance of the world. This ignorance takes the form of uncertain predictions and incomplete explanations of causation. Uncertainty in predictions hinders us from solving problems well. Incompleteness in explanations hinders

us from finding the best problems to solve. Models of the world that we use to predict and explain relate beliefs about the world in ways that are useful in predicting and explaining the world. We may call excellence in relating beliefs *reason* and the rules that we use to help us relate beliefs well the *rules of reason*.

"Excellence in relating beliefs depends on the type of end we choose to pursue. When we pursue temporal ends, we seek to find the best solution to a given temporal problem. Excellence in relating beliefs concerns reason within the frame that we use to describe this temporal problem. We may call the set of rules that we use to relate these beliefs *the rules of logic*.

"When we pursue timeless ends, we seek not only to solve given problems, but also to find problems to solve. Excellence in relating beliefs concerns not only the frames we use to solve given problems, but also those we use to find problems to solve. We may call the set of rules that we use to judge the latter *the rules of dialectics* after the dialectic form of discourse that Socrates used to explain what timeless ends are not.

"Excellence in solving given problems calls for models of the world that are completely unambiguous. In contrast, excellence in finding problems to solve in pursuing timeless ends calls for models that are ambiguous with respect to the timeless end and the means of pursuing the timeless end. If these two concepts were not ambiguous, there would be no room for better approximates of these two concepts.

"The rules of dialectics help us find problems to solve in pursuing timeless ends. As we saw in the first chapter, finding the best problem to solve in pursuing a timeless end calls for us to choose a frame, which in turn calls for us to choose a frame, which in turn calls for us to choose a frame, and so on to infinity. We can address this infinitely large problem well by deciding well using the multiple-frame model of pursuing Wisdom."

were changed to:

"Pursuing ends well calls for us to overcome our ignorance of the world. This ignorance takes the form of uncertain predictions and incomplete explanations of causation. Uncertainty in predictions hinders us from solving problems well. Incompleteness in explanations hinders us from finding the best problems to solve.

"Models of the world that we use to predict and explain relate beliefs about the world in ways that are useful in predicting and explaining the world. We may call excellence in relating beliefs *reason* and the rules that we use to help us relate beliefs well the *rules of reason*. Excellence in relating beliefs depends on the type of end we choose to pursue.

"When we pursue temporal ends, we seek to find the best solution to a given temporal problem. Excellence in relating beliefs concerns reason within the frame that we use to describe this temporal problem. We may call the set of rules that we use to relate these beliefs *the rules of logic* after the rules of reason Aristotle used to relate beliefs in his pursuit

of natural forms. Excellence in solving given problems calls for models of the world that are completely unambiguous.

"When we pursue timeless ends, we seek not only to solve given problems, but also to find problems to solve. Excellence in relating beliefs concerns not only the frames we use to solve given problems, but also those we use to find problems to solve. We may call the set of rules that we use to judge the latter *the rules of dialectics* after the dialectic form of discourse that Socrates used to explain what these timeless ends are not. Excellence in finding problems to solve in pursuing timeless ends calls for models that are ambiguous with respect to the timeless end and the means of pursuing the timeless end. If these two concepts were not ambiguous, there would be no room for better approximates of these two concepts.

"As we saw in the first chapter, finding the best problem to solve in pursuing a timeless end calls for us to choose a frame, which in turn calls for us to choose a frame, which in turn calls for us to choose a frame, and so on to infinity. We can address this infinitely large problem well by deciding well using the multiple-frame model of pursuing Wisdom."

Chapter 8, Useful Reasoning, last paragraph, footnote

Changed "a modern concept" to "a biological concept" in the first sentence.

Changes in Version 2011.08.02

Chapter 3, *A Decision Tree Interpretation of Quantum Mechanics*, first paragraph, last footnote

"[9] Implicit in this decision-oriented model of the world is belief that free will exists. We currently have no empirical way of disproving that free will either exists or does not exist. However, we can logically determine that we ought to act as if free will exists: If free will does not exist, we have no choice in what to believe; including whether to believe that free will exists or does not exist. We are as puppets in a shadow play. On the other hand, if free will exists, we have a choice in whether to believe that free will exists or does not exist. If we choose to believe that free will exists, we have a logical reason to try to pursue the invariant end of deciding well. If we choose to believe that free will does not exist, we will have no logical reason to try to pursue the invariant end of deciding well. From the invariant view of deciding well, we ought to choose the research program that seeks to disprove the beautiful choice, which is that free will exists. This calls for us to act as if we believe that free will exists."

was changed to:

"[9] Implicit in this decision-oriented model of the world is belief that free will exists. We currently have no empirical way of disproving that free will either exists or does not exist. However, from the multiplex view, we ought to choose the research program that seeks to

disprove the beautiful choice, which is that free will exists. This calls for us to act as if we believe that free will exists."

Chapter 4, *A Crude Look at the Whole*, last paragraph, footnote

"[13] From the invariant view of deciding well, we ought to replace statistics-based macroeconomic models with agent-based computer simulations. These simulations ought to explain speculative bubbles, business cycles, long-term technological change ("Kondratieff waves"), and very long-term cultural change ("economic ages"). The purpose of these high-level models ought to be to help us find better problems to solve. We ought to test these models by testing how well they help us find better problems to solve. This conflicts with the belief of Austrian School economists that we do not need to test theories that explain human action. It also conflicts with the closely related belief of some complex adaptive system scientists that we do not need to test computer models of emergent phenomena in social systems. See Lissack, M. R. & Richardson, K. A, "When Modeling Social Systems, Models ≠ the Modeled: Reacting to Wolfram's A New Kind of Science," *Emergence*, 2001, Vol. 3, No. 4, pp. 95–111."

was deleted.

Chapter 7, *Temporal OODA Loop Analysis*, second paragraph

Changed "self-referential, self-similar process" to " self-similar process" in the first sentence.

Chapter 7, *Timeless OODA Loop Analysis*, first paragraph

Changed "solve" to "address" in the first sentence.

Added the sentence: "In short, he took a thoroughly biological approach to learning."

Chapter 8, Natural Reasoning, last paragraph

Changed "evidence" to "empirical evidence" in the first sentence.

Changes in Version 2011.08.08

Preface, fourth paragraph

Changed "*multiple-frame* models" to "*multiple-frame* models of deciding well" in the first sentence.

Preface, ninth paragraph

Changed "extend" to "create or extend" in the last sentence.

Chapter 1, *The EOQ/RTS Example*, second paragraph

Changed "parts" to "hoods" in the second sentence.

Changed "hoods" to "of these hoods" in the fourth sentence.

Chapter 1, *The EOQ/RTS Example*, last paragraph

Removed italics from "but also products in the form of knowledge of how to produce ever more wisely" in the fifth sentence.

Chapter 1, *The Need for Timeless Frames*, second bullet point

Changed "per se" to "in themselves" in the first sentence.

Chapter 1, *Steps for Building Multiple-Frame Models*, last paragraph, footnote

Changed "logic" to "reason" in the first sentence.

Chapter 3, Pursuing the Ring of Truth, last paragraph

Changed "By combining the frames for contemplating and living well, we learn that beauty" to "Beauty" in the first sentence.

Chapter 3, *Three Approaches to Policy*, second paragraph

Added the following sentence to the end of the paragraph:

"People who take this approach put their faith in the wisdom of current experts."

Chapter 3, *Three Approaches to Policy*, third paragraph

Replaced the footnote:

"[4] According to Thomas Sowell, when confronted with the complexities of life, those in the first group will tend to put their faith in the wisdom of experts and those in the second group will tend to put their faith in the wisdom of crowds, especially in the accumulated wisdom of the ages handed down to us in the form of language, culture, case law, and economic relations. For more on this see Thomas Sowell, *A Conflict of Visions: Ideological Origins of Political Struggles* (New York: William Morrow, 1987)."

with the following new sentence and footnote:

"People who take this approach put their faith in the wisdom of current concepts, customs, case law, and common sense.[4]"

"[4] In his book, *A Conflict of Visions: Ideological Origins of Political Struggles* (New York: William Morrow, 1987), Thomas Sowell distinguishes between what he calls unconstrained and constrained visions. From an unconstrained view, the problems we face are relatively simple relative to our ability to solve them. The problems we face are obvious. All we need to do to solve our problems is to put the right people in charge. This is consistent with an engineering approach to policy. From a constrained view, the problems we face are complex relative to our ability to solve them. The process of finding problems to solve is at least as important as the process of solving problems. Further, the people most able to solve problems well are the people closest to them. This is consistent with a biological approach to policy."

Chapter 3, *Three Approaches to Policy*, last paragraph

Added the following sentence to the end of the paragraph:

"People who take this approach put their faith in the pursuit of wisdom that transcends current knowledge."

Chapter 3, *Public Order*, first three paragraphs

"Associated with each of these three ways of thinking about policy is a distinct way of thinking about public order. From the engineering view, policymakers find and solve public problems. In doing so, they seek to impose their sense of order on the world. From the engineering view, increasing public order is always good.

"From the biological view, policymakers promote a climate that helps people live well. This includes allowing people to experiment with new ways of living well. Too much or too little public order shuts down this experimentation. From the biological view, increasing public order is good when there is too little of it and bad when there is too much of it.

"From the public view, policymakers promote a climate that helps people pursue Wisdom. This gives rise to an invariant concept of public order that concerns how well people decide. From the public view, increasing *invariant* public order is always good."

were changed to:

"Associated with each of these three ways of approaching policy is a distinct way of thinking about public order. Policymakers who take the engineering approach find and solve public problems. In doing so, they seek to impose their sense of order on the world. From this view, increasing public order is always good.

"Policymakers who take a biological approach promote a climate that helps people live well. This includes allowing people to experiment with new ways of living well. Too much or too little public order shuts down this experimentation. From this view, increasing public order is good when there is too little of it and bad when there is too much of it.

"Policymakers who take a public approach promote a climate that helps people pursue Wisdom. This gives rise to an invariant concept of public order that concerns how well people decide. From this view, increasing *invariant* public order is always good."

Chapter 3, *Public Order*, fourth paragraph

Changed "the example" to "an example" in the first sentence.

Chapter 3, *Public Order*, fifth paragraph, first two sentences

"A team taking an engineering approach would approach the problem of ordering themselves. Their first task would be to reduce the problem of ordering themselves to a set of problems that they can address using what they currently know."

were changed to:

"A team taking an engineering approach would reduce the problem of ordering themselves to a set of problems that they can address using what they currently know."

Chapter 3, *Public Order*, last paragraph

Changed "the public approach" to "a public approach" in the first sentence.

Chapter 3, *Zero Public Entropy*, title

Changed title to "***Public Entropy***" and moved it down two paragraphs.

Chapter 3, *Public Entropy*, new first two paragraphs

"One lesson that we can learn from contemplating how liquids become superfluid is the usefulness of the concept of entropy. Entropy is a measure of the amount of potentially useful resources in an object. Modern scientists first used this concept to think about engines that derive useful work from differences in heat. In this context, entropy is a measure of the amount of useful energy that it is theoretically possible to remove from an object. They later used this concept to think about the amount of useful information in an object. In this context, entropy is a measure of the amount of signal that it is theoretically possible to remove from an object. We may use this concept to think about useful resources in decision processes. In this context, entropy is a measure of the amount of wealth that it is theoretically possible to remove from a decision process. We may call this measure *public entropy*. We pursue the transcendental end of *zero public entropy* by removing *non-knowledge* wealth from a decision process, thereby inducing the creation of knowledge wealth.[5]"

"Zero public entropy is the transcendental end of the process of inducing the creation of knowledge useful in deciding well. It is the dynamic alternative to Pareto optimality.[6] From the view of a person behind the veil of complete ignorance, it is the ideal process of deciding well."

"[5] For more on the process of inducing the creation of knowledge, see the Appendix. Note that public entropy relates inversely with physical entropy. Such is life."

"[6] Pareto optimality is the state of the world in which it is impossible to make any person better off without making at least one other person worse off."

were changed to:

"One lesson that we can learn from contemplating how liquids become superfluid is the usefulness of the concept of entropy. Entropy is a measure of the amount of disorder in an object. We may also use this concept as a measure of wasted *non-knowledge* wealth in a process. We may call this measure *public entropy*.[5]"

"*Zero public entropy* is the transcendental end of the process of lowering public entropy.[6] From the view of modern economics, it is the dynamic alternative to Pareto optimality.[7] From the view of a person behind the veil of complete ignorance, it is what makes the ideal process of deciding well ideal."

"[5] From the view of modern science, 'entropy' has several meanings that concern disorder, inefficiency, and unpredictability. Some are useful in studying energy and others in studying information. In 1827, James Clerk Maxwell imagined how an imaginary intelligent being, which Lord Kelvin called a "demon," could convert information into energy by sorting gas molecules by their kinetic energy. In 2010, a team of Tokyo scientists confirmed that it is is possible to convert information into energy (Toyabe, S., Sagawa, T., Ueda, M. Muneyuki, E., & Sano, M. "Experimental demonstration of the information-to-energy conversion and validation of the generalized Jarznynski equality," *Nature Physics*, vol. 6, pp. 988–92). A science based on pursuing Wisdom may help us explain the relation between information and energy in ways that are useful in helping us find problems to solve in pursuing Wisdom. Developing such a science calls for defining public entropy."

"[6] Removing non-knowledge wealth from the process of deciding well without lowering the quality of deciding well induces the creation of knowledge of how to decide well using fewer non-knowledge resources. For more on the process of inducing the creation of knowledge useful in deciding well, see the Appendix."

"[7] Pareto optimality is the state of the world in which it is impossible to make any person better off without making at least one other person worse off."

Chapter 3, *Decision-Oriented Interpretations of Quantum Mechanics*, third paragraph

Changed "many decades" to "long" in the first sentence.

Changed "Following this logic" to "Thus" in the last sentence.

Chapter 3, *Decision-Oriented Interpretations of Quantum Mechanics*, fourth paragraph

Changed "public" to "multiplex" in the first sentence.

Chapter 6, Experiencing the Mysterious, second paragraph, second and third sentences

"From the multiplex view, there is no rational conflict between pursuing the temporal end of mystical oneness and the timeless end of revering life well. Indeed, these two ends often complement each other."

were changed to:

"From the multiplex view, these two ends often complement each other."

Chapter 6, A Common Timeless End, first paragraph

Eliminated all italics.

Chapter 8, Useful Reasoning, fifth paragraph

"As we saw in the first chapter, finding the best problem to solve in pursuing a timeless end calls for us to choose a frame, which in turn calls for us to choose a frame, which in turn calls for us to choose a frame, and so on to infinity. We can address this infinitely large problem well by deciding well using the multiple-frame model of pursuing Wisdom."

was changed to:

"These models for pursuing boundless factors of deciding well can never be both logically consistent and complete. Each contains the belief that we will never know the true meaning of its timeless end. If we claim that we have found this meaning, then the model is logically inconsistent. On the other hand, if we claim that we have not found this meaning, then we cannot prove that the model is logically complete. To prove that this model is complete, we need a more complete model. To prove that this model is complete, we need a still more complete model. To prove that this model is complete, we need a still more complete model. We may continue this cycle of ever-increasing completeness until we arrive at the model for pursuing Wisdom put forth in this work.[3]"

"[3] Note that these two arguments parallel the basic arguments that Kurt Gödel used in his two incompleteness theorems. The multiplex model for pursuing Wisdom is consistent with Gödel's belief in the existence of an *a priori* science, but not with the belief in the existence of an *a priori* science based on modern reasoning. Multiplex reasoning is alien to modern science, but not to modern art. In the movie based on Carl Sagan's novel, *Contact*, the person who discovered the primer for the alien plans explained the key insight that led to this discovery: "An alien intelligence is going to be more advanced. That means efficiency functioning on multiple levels and in multiple dimensions." The multiplex reasoning for pursuing Wisdom concerns efficiency functioning on all levels of all frames of deciding well."

Chapter 8, Summary, first paragraph

"Understanding the process by which we progress toward these timeless ends can provide us with tools for helping us find better problems to solve."

was changed to:

"Understanding the process by which we best progress toward these timeless ends can help us find better problems to solve."

Changes in Version 2012.08.12

Chapter 8, Useful Reasoning, end

Added the paragraph:

"The complete multiplex model of pursuing Wisdom consists of an unknown number of incomplete frames. In theory, it provides us with a framework for exposing not only the conflicts in our networks of beliefs, but also all holes in these networks.[5] Hence, we may call it *rationally* complete.[6]"

"[5] Holes in our networks of beliefs emerge from timeless ends that concern the models we use to describe the world. Consider the difference between Quine's pragmatism and the boundless pragmatism put forth in this work. Quine would have us pursue the timeless end of the natural sciences. As we pursue this end, we discover things that conflict with our current beliefs. Quine would have us settle these conflicts in the least disruptive way. This is consistent with the way the Europeans solved the problem created by the discovery of what they now call black swans. Following Quine's conservative rule, we ought to prefer the EOQ model to the RTS model as a means of describing how best to set up tools. Neither of these models directly concerns the timeless end of the natural sciences. Hence, we ought to choose the model that better fits our current beliefs about science, which is the EOQ model. It is the more "scientific" model of setting up tools. From this "naturalistic" view, the discovery of the usefulness of learning through experience in setting up tools creates a conflict rather than a hole in our networks of beliefs."

"[6] Quine's concept of holism emerges from the way we induce general knowledge from experience, but not from the inexhaustibility of knowledge. From this "naturalistic" view, *the philosophy of science is philosophy enough.* In contrast, the multiplex concept of holism put forth in this work emerges not only from the way we induce general knowledge from experience, but also from the inexhaustibility of knowledge. From this "invariant" view, *the philosophy of science is philosophy enough if and only if science includes the interwoven pursuits of all boundless factors of pursuing Wisdom*. The incompleteness of Quine's concept of holism gave rise not only to Morton White's argument with Quine over the scope of holistic pragmatism, but also to Jaegwon Kim's criticism of Quine's "naturalistic" theory of

knowledge for not having a normative element. The normative element missing from Quine's theory of knowledge is the teleonomic pursuit of the Good."

Chapter 8, Natural Reasoning, second paragraph, second footnote

"[6] Philosophers of science may find in this pursuit parallels to W. V. O. Quine's naturalistic epistemology. A major difference is that the multiplex approach considers more of the demand side of pursuing the Truth. The relative incompleteness of Quine's epistemology gave rise to both Jaegwon Kim's criticism of Quine's epistemology for not having a normative element and Morton White's argument with Quine over the scope of holistic pragmatism. *The philosophy of science is philosophy enough if and only if science includes the interwoven pursuits of all boundless factors of pursuing Wisdom*."

was deleted.

Changes in Version 2012.08.20

Acknowledgments, last paragraph

"Finally, there is my father, John Huntington Harris, who succeeded better than most at balancing pragmatism and idealism. He owed his pragmatism to his paternal grandfather, a successful Iowa entrepreneur, whose father and grandfather had been New England sea captains. He owed his idealism to his Congregationalist mother, who drummed her Social Gospel ideals into her Grinnell High School students, including Harry Hopkins, and into her three sons. Despite my father's great ability to get to the root of most matters by seeing "the big picture," he could not grasp what I had written. He claimed that this was due to my use of such terms as "recursionist economics" and "paradigm shift." A year and a half after his death in 2003, I recognized that my style was too pretentious. I have since tried to write more plainly."

was changed to:

"The last three were sons of early-twentieth-century bankers from Grinnell, Iowa. Each had a different view of how best to impart wisdom. My great uncle, Wilfred James McNeil, told me parables based on his experiences as Comptroller of the Department of Defense under its first six secretaries. My business ethics professor, George Leland Bach, took a Socratic approach. My father, John Huntington Harris, pointed out people and habits worth imitating. He also expressed great contempt for people who too readily reduce the world to numbers, especially for those he worked with in the Statistical Control "Group" of the Army Air Force, who he believed ought to know better. All three knew that the way forward that can be told is not the true way forward. This work concerns the way that we tell the way forward. It concerns what lovers of wisdom call *logos*."

Preface, third paragraph

Changed "universal" to "universally useful and inexhaustible" in the second sentence.

Enclosed "boundless factors" in parentheses in the second sentence.

Changed "universal, boundless" to "boundless" in the block quote (4 occurrences).

Changed "three steps" to "steps" in the last sentence.

Preface, fourth paragraph

Changed "universal, boundless" to "boundless" in all (2 occurrences).

was deleted.

Preface, sixth paragraph

"Students of Western thought may find in this recursive process a synthesis of the processes by which Plato and Aristotle pursued wisdom. Like the process of Plato, it involves pursuing knowledge of ideal forms. Unlike this process, it is endless. We shall never see the whole truth by the light of all that is good. Like the process of Aristotle, it involves rules of reason. Unlike this process, it involves not only rules that bind beliefs together into coherent models of the world, but also rules for binding these models together into a coherent whole. The source of the coherence for binding these models together is the symmetry of deciding well."

was deleted.

Preface, new sixth paragraph

Changed "universal factors of deciding well that we can never have in excess" to "boundless factors of deciding well" in the last sentence.

Preface, last paragraph

Deleted ", and that on each reading they will better understand deciding well" from the last sentence.

Chapter 1, *Steps for Building Multiple-Frame Models*, first paragraph

Changed "universal" to "universally useful and inexhaustible" in the second sentence.

Enclosed "boundless factors" in parentheses in the last sentence.

Chapter 3, *Public Order*, last paragraph

Changed "groups of atoms act as if they were a single quantum object" to "groups of these atoms act as if they were a single atom" in the last sentence.

Chapter 3, *Public Entropy*, first paragraph, footnote, last two sentences

Changed "is is" to "is" in the third sentence.

Chapter 3, *Public Entropy*, first paragraph, footnote, last two sentences

"A science based on pursuing Wisdom may help us explain the relation between information and energy in ways that are useful in helping us find problems to solve in pursuing Wisdom."

were changed to:

"From the multiplex view, the concept of public entropy helps us explain the relation between information and energy in ways that are useful in helping us find problems to solve in pursuing Wisdom."

Chapter 4, Refining Everyday Thinking, fifth paragraph, footnote

"[2] Note that we judge the usefulness of these description within bounds. Newtonian mechanics is good for predicting the behavior of large items moving at low speeds, but poor at predicting either the behavior of very small objects or the behavior of objects moving at very high speeds. Also note that descriptions of the world may have their own logic. A classic example is quantum mechanics, which includes such apparently strange behavior as objects that must rotate 360 degrees *twice* to return to their initial state."

was changed to:

"[2] Note that we judge the usefulness of these descriptions within bounds. Newtonian mechanics is good for predicting the behavior of large items moving at low speeds, but poor at predicting either the behavior of very small objects or the behavior of objects moving at very high speeds. Note too that descriptions of the world may have their own logic. A classic example is quantum mechanics, which includes such apparently strange behaviors as objects that must rotate 360 degrees *twice* to return to their initial state."

Chapter 4, *Learning from Experience*, title

Changed title to "*Learning through Experience*."

Chapter 4, *Learning through Experience*, second paragraph, fourth sentence

"Trading problems that give rise to uneven flow that Toyota and others have solved include (1) distributors who fail to share knowledge about their customers with their suppliers for fear of losing business; (2) workers who fail to tell their bosses about foolish procedures for fear of losing work; and (3) workers who lose their jobs during slow times because their labor contracts do not let wages fall."

was changed to:

"Distributors fail to share knowledge about their customers with their suppliers for fear of losing business. Workers fail to tell their bosses about foolish procedures for fear of losing work. Workers prefer fixed to flexible pay, which leads to layoffs during slow times."

Chapter 4, Useful Reminders, second paragraph

Changed "tend to change" to "often change" in the second sentence.

Chapter 5, *Promote Pursuing Wisdom, not Temporal Order*, second paragraph, last sentence

"These mistakes include such things as financial products that look good in the short run but are likely to fail in the long run; the proliferation of models for pricing financial assets that presume that periods of great turbulence are rare; and a regulatory environment that favors the temporal values of economic growth and stability over the invariant value of Wisdom, hence over the invariant values of the Good, the Truth, Justice, Wholeness, and all of the other boundless factors of pursuing Wisdom."

was deleted.

Chapter 5, Liberalism, third paragraph

Changed "In the long run, nothing" to "Nothing" in the last sentence.

Chapter 6, *Einstein's Twin Warnings*, last paragraph

Changed "who think first of Jesus as the way, and the truth, and the life," to "who think first of Jesus as the way, and the truth, and the life, as the Word made flesh," in the second sentence.

Chapter 6, A Common Timeless End, first paragraph

Changed "both types of views" to "both" in the fifth sentence.

Chapter 7, *A Revolutionary Anomaly*, second paragraph, first two sentences

"From the multiplex view, playing games well calls for a grander concept of reason than either logic or dialectics. Playing games well is a matter of choosing the best frame for what we perceive is the given strategic situation."

were changed to:

"From the multiplex view, playing games well is a matter of choosing the best frame for what we perceive is the given strategic situation."

Chapter 7, *Temporal OODA Loop Analysis*, second paragraph

Changed "He" to "Boyd" in the last sentence.

Chapter 7, *Timeless OODA Loop Analysis*, first paragraph

"Boyd also used his OODA loop model to address problems in which learning was important. This called for (1) defining a timeless end of competing well; (2) adding a learning function to the basic cycle; and (3) defining our relations with each other. Boyd (1) defined his concept of the timeless end of competing well to be surviving on our own terms; (2) expanded the orientation element in the OODA loop to include a learning function that includes not only our past experiences and new information (from our recent experiences), but also our genetic heritage, cultural traditions, and tools for analyzing and synthesizing; and (3) argued that we form groups on all scales in order better to survive on our own terms. In short, he took a thoroughly biological approach to learning."

was changed to:

"Boyd also used his OODA loop model to address problems in which learning was important. This called for defining a timeless end of competing well. Boyd defined his concept of the timeless of competing well to be surviving on our own terms. This is a thoroughly biological concept. It also called for adding a learning function to the basic cycle. Boyd expanded the orientation element in the OODA loop to include a learning function that includes not only our experiences, but also our genetic heritage, cultural traditions, and tools for analyzing and synthesizing. Finally, it called for defining our relations with each other. Boyd argued that we form groups on all scales in order better to survive on our own terms."

Chapter 7, *Boyd's Grand Strategy*, last paragraph

Changed "thoroughly biological" to "biological" in the second sentence.

Chapter 7, *The Grandest Possible Strategy*, last paragraph

Changed "the strategy of" to "that of" in the first sentence.

Changed "This strategy" to "It" in the last sentence.

Merged last paragraph into preceding paragraph.

Chapter 8, Useful Reasoning, fifth paragraph, footnote, first sentence

Changed "The multiplex model" to "Note too that the multiplex model" in the second sentence.

Chapter 8, Useful Reasoning, fifth paragraph, footnote, third sentence

"Multiplex reasoning is alien to modern science, but not to modern art."

was changed to:

"Modern reasoning concerns the rules we use to bind beliefs together into coherent models of the world. The multiplex reasoning of deciding well concerns not only the rules we use to bind beliefs together into coherent models of the world, but also the rules we use to bind these models together into a coherent whole. Such reasoning is alien to modern science, but not to modern art."

Chapter 8, Useful Reasoning, last paragraph

Changed "*rationally* complete" to "*reasonably* complete" in the last sentence.

Chapter 8, Useful Reasoning, last paragraph, first footnote

"[5] Holes in our networks of beliefs emerge from timeless ends that concern the models we use to describe the world. Consider the difference between Quine's pragmatism and the boundless pragmatism put forth in this work. Quine would have us pursue the timeless end of the natural sciences. As we pursue this end, we discover things that conflict with our current beliefs. Quine would have us settle these conflicts in the least disruptive way. This is consistent with the way the Europeans solved the problem created by the discovery of what they now call black swans. Following Quine's conservative rule, we ought to prefer the EOQ model to the RTS model as a means of describing how best to set up tools. Neither of these models directly concerns the timeless end of the natural sciences. Hence, we ought to choose the model that better fits our current beliefs about science, which is the EOQ model. It is the more "scientific" model of setting up tools. From this "naturalistic" view, the discovery of the usefulness of learning through experience in setting up tools creates a conflict rather than a hole in our networks of beliefs."

was changed to:

"[5] Conflicts in our networks of belief occur when beliefs compete for the same function in our system of beliefs. Quine would have us settle these conflicts in the least disruptive way. This is consistent with the way the Europeans solved the problem created by the discovery of what they now call black swans. It is also consistent with choosing the EOQ model over the RTS model as a means of describing how best to set up tools. From the temporal view of modern science, the EOQ model is the more "scientific" model of setting up tools. In contrast, holes in our networks of beliefs emerge from the wholeness of our belief systems. From the "holistic" view of invariant science, the discovery of the usefulness of learning through experience in setting up tools exposes holes throughout our networks of beliefs. We fill these holes with beliefs that are consistent with solving the problems we face by learning through experience."

Chapter 8, Useful Reasoning, last paragraph, last footnote

"[6] Quine's concept of holism emerges from the way we induce general knowledge from experience, but not from the inexhaustibility of knowledge. From this "naturalistic" view, *the*

philosophy of science is philosophy enough. In contrast, the multiplex concept of holism put forth in this work emerges not only from the way we induce general knowledge from experience, but also from the inexhaustibility of knowledge. From this "invariant"view, *the philosophy of science is philosophy enough if and only if science includes the interwoven pursuits of all boundless factors of pursuing Wisdom*. The incompleteness of Quine's concept of holism gave rise not only to Morton White's argument with Quine over the scope of holistic pragmatism, but also to Jaegwon Kim's criticism of Quine's "naturalistic" theory of knowledge for not having a normative element. The normative element missing from Quine's theory of knowledge is the teleonomic pursuit of the Good."

was changed to:

"[6] Quine's concept of holism emerges from the way we induce general knowledge from experience, but not from the inexhaustibility of knowledge. From this view, *the philosophy of science is philosophy enough*. In contrast, the multiplex concept of holism put forth in this work emerges not only from the way we induce general knowledge from experience, but also from the inexhaustibility of knowledge. From this view, *the philosophy of science is philosophy enough if and only if science includes the interwoven pursuits of all boundless factors of pursuing Wisdom*. The incompleteness of Quine's concept of holism gave rise to both Morton White's argument with Quine over the scope of holistic pragmatism and Jaegwon Kim's criticism of Quine's epistemology for not having a normative element. (From the multiplex view, the normative element missing from Quine's theory of knowledge is the teleonomic pursuit of the Good.)"

Chapter 8, Natural Reasoning, last paragraph

Changed "multiplex view" to "multiplex view of deciding well" in the last sentence.

Changes in Version 2012.08.24

Chapter 3, Leaving Behind Modern Explanations, title

Changed title to "Contemplating the Way Forward."

Chapter 3, Contemplating the Way Forward, first paragraph

"Pursuing Wisdom calls for us to choose among a nearly infinite number of nearly infinite paths. Thinking deeply about this problem calls for us to leave behind modern models for explaining the world. We can use the concept of *transcendental recursive objects* to help us muddle forward ever more wisely."

was changed to:

"Pursuing Wisdom calls for us to think deeply about how we decide. We can use the concept of *transcendental recursive objects* to help us organize our thoughts."

Chapter 3, *Public Order*, last paragraph

Changed "below 170 billionths of a degree above absolute zero" to "at roughly 170 billionths of a degree above absolute zero," in the third sentence.

Chapter 3, *A Decision-Tree Interpretation of Quantum Mechanics*, last paragraph

Changed "what we believe we know" to "what we believe we know about the world" in the last sentence.

Chapter 4, Refining Everyday Thinking, last paragraph, footnote

Changed "more complete" to "pragmatic" in the last sentence.

Chapter 4, *Two Types of Ignorance*, last paragraph, last footnote

"[5] In complexity science terms, invariant science is a self-similar, self-referential process that lies between what we may call *positive science* (the set of knowledge that helps us predict well but helps us explain nothing) and what we may call *metaphysics* (the set of models that transcends everyday thinking). Within this process, we may call the set of models that we use to help us predict well *true science* and the set of models that we use to explain well *metascience*. Only true science models can be both logically consistent and complete."

was changed to:

"[5] From the multiplex view, invariant science is a self-similar, self-referential process that includes its own metascience."

Chapter 4, Useful Reminders, first paragraph

Deleted "— to see the world in a grain of sand" from the last sentence.

Chapter 6, *Heroic Death*, second paragraph

Changed "to distinguish" to "do we learn to distinguish" in the second sentence.

Chapter 7, The Scope of Game Theory, fourth paragraph

Changed "recognized that Hofstadter's game did not fit into modern game theory categories, but this knowledge did not help him decide how to decide" to "claimed that he was unable to decide" in the fifth sentence.

Chapter 7, *A Revolutionary Anomaly*, first paragraph

Changed "inability to think about Hofstadter's game" to "claim that he was unable to behave" in the first sentence.

Chapter 7, *A Revolutionary Anomaly*, first paragraph, last two sentences

"It is neither logical nor dialectical. From the view of modern philosophy, it falls between the cracks of reason."

were changed to:

"It falls between the cracks of modern reason."

Chapter 7, *A Revolutionary Anomaly*, second paragraph

Changed "a grander concept of reason than either logic or dialectics" to "a grander concept of reason" in the first sentence.

Chapter 7, *A Revolutionary Anomaly*, first paragraph

Changed "inability to think" to "claim that he was unable to think" in the first sentence.

Chapter 8, Useful Reasoning, fourth paragraph

Changed "these two concepts" to "them" in the last sentence.

Chapter 8, Useful Reasoning, fifth paragraph

"These models for pursuing boundless factors of deciding well can never be both logically consistent and complete."

were changed to:

"Models for pursuing timeless ends can never be both logically consistent and complete."

Changes in Version 2012.08.25

Preface, last paragraph

"My hope in writing such a short book is that people will read it more than once."

was changed to:

"The spirit of our age concerns breaking unwieldy wholes into parts in order to solve problems better. A major disadvantage of using this process is forgetting to consider the infinitely greater whole. Although definite knowledge of this whole will remain forever beyond our grasp, we must not pass over it in silence. When we expand the scope of the problems we face to the limits of imagination, a structure of invariant values emerges. Understanding the process by which we best progress toward these timeless ends can help us find better problems to solve."

Chapter 8, Useful Reasoning, fifth paragraph, third through last sentences

"If we claim that we have found this meaning, then the model is logically inconsistent. On the other hand, if we claim that we have not found this meaning, then we cannot prove that the model is logically complete. To prove that this model is complete, we need a more complete model. To prove that this model is complete, we need a still more complete model. To prove that this model is complete, we need a still more complete model. We may continue this cycle of ever-increasing completeness until we arrive at the model for pursuing Wisdom put forth in this work."

was changed to:

"If we find this meaning, the model is complete, but inconsistent. If we do not find this meaning, the model is consistent, but incomplete. Further, to prove that this model is complete, we need a more complete model. To prove that this model is complete, we need a still more complete model. To prove that this model is complete, we need a still more complete model. We may continue this cycle of ever-increasing completeness until we arrive at the model for addressing the problem that includes all other problems, which is the model of pursuing Wisdom put forth in this work."

Chapter 8, Useful Reasoning, sixth paragraph

Changed "Hence" to "Thus" in the second sentence.

Added new section title, "Complete Reasoning," at the end of the paragraph.

Moved paragraph and new heading in front of preceding paragraph, thereby making the last two paragraphs in this section paragraphs in a new section.

Chapter 8, Complete Reasoning, first paragraph, footnote

Changed "multiplex reasoning for pursuing Wisdom" to "multiplex reasoning of deciding well" in the last sentence.

Chapter 8, Complete Reasoning, last paragraph

Changed "multiplex" to "multiple-frame" in the first sentence.

Changed "framework" to "structure" in the second sentence.

Chapter 8, Natural Reasoning, first paragraph

"From the view of modern biology, living beings cooperate well in order to compete well. Those that seek to cooperate before they seek to compete, to look first for win–win solutions to resource problems before they seek to compete over resources, are an anomaly. In contrast, from the multiplex view, living beings compete well in order to cooperate well. They seek to cooperate well in order to make the best use of knowledge in living well. Only when they lack the means to cooperate well do they compete. Living beings that seek to compete before they seek to cooperate are the special case of beings that have not yet developed the wisdom to do otherwise. Which of these two views is the better view for helping us find problems to solve, hence for explaining the world?"

was changed to:

"From the view of modern biology, living beings cooperate well in order to compete well. Those that seek to cooperate before they seek to compete, to look first for win–win solutions to resource problems before they seek to compete over resources, are anomalies. From the multiplex view, living beings compete well in order to cooperate well. Only when they lack the means to cooperate well do they compete. Living beings that seek to compete before they seek to cooperate are the special case of beings that have not yet developed the wisdom to do otherwise. Which of these two views is the better view for helping us find problems to solve, hence for explaining the world?"

Chapter 8, Summary, last section

"**Summary**
The spirit of our age concerns breaking unwieldy wholes into parts in order to solve problems better. A major disadvantage of using this process is forgetting to consider the infinitely greater whole. Although definite knowledge of this whole will remain forever beyond our grasp, we must not pass over it in silence. When we expand the scope of the problems we face to the limits of imagination, a structure of invariant values emerges. Understanding the process by which we best progress toward these timeless ends can help us find better problems to solve. We shall not grow wiser before we learn that much that we have done was very foolish."

was deleted.

Changes in Version 2012.08.27

Acknowledgments, last paragraph

Changed "Statistical Control "Group"" to "Management Control Directorate (Organizational Planning and Statistical Control Divisions)" in the last sentence.

Deleted the last two sentences: "This work concerns the way that we tell the way forward. It concerns what lovers of wisdom call *logos*."

Preface, seventh paragraph

Changed "the ideal path" to "the ideal way" in the last sentence.

Preface, sixth paragraph

Changed "timeless analogue of the modern economic cycle of" to "information-age analogue of" in the last sentence.

Preface, seventh paragraph

Changed "the ideal path" to "*logos*, the ideal way" in the last sentence.

Preface, last paragraph

"The spirit of our age concerns breaking unwieldy wholes into parts in order to solve problems better. A major disadvantage of using this process is forgetting to consider the infinitely greater whole. Although definite knowledge of this whole will remain forever beyond our grasp, we must not pass over it in silence. When we expand the scope of the problems we face to the limits of imagination, a structure of invariant values emerges. Understanding the process by which we best progress toward these timeless ends can help us find better problems to solve."

was changed back to:

"My hope in writing such a short book is that people will read it more than once."

Chapter 1, *Ever More Complete Multiple-Frame Models*, fifth paragraph

Changed "timeless technique" to "technique" in the fourth sentence.

Chapter 3, *Three Approaches to Policy*, third paragraph, footnote

Changed "consistent with a biological approach" to "inconsistent with an engineering approach" in the last sentence.

Moved the footnote to the end of second paragraph.

Chapter 3, *Public Entropy*, first paragraph

Changed "decision process" to "process" in the fourth sentence.

Chapter 4, *Learning through Experience*, title

Changed title to "*Learning by Doing*."

Chapter 5, *A Sovereign Rights Story for Pursuing Wisdom*, last paragraph, last footnote

Removed quotation marks from the first sentence.

Changed "The spirit of our age tends to undermine" to "Modernism undermines" in the fourth sentence.

Changed "prevailing attitude" to "modern spirit" in the fifth sentence.

Chapter 5, *Promote Savings for Welfare*, last paragraph, first footnote

Changed "pursuing Wisdom" to "the pursuit of Wisdom" in the last sentence.

Chapter 8, Useful Reasoning, last paragraph, footnote

Changed "a carp that glows in the dark can be said to exist if it only exists in the mind of a geneticist who knows how to make fish that glow in the dark" to "the means to land two people on the moon and bring them safely back to earth existed at 12 A.M. zero meridian time on January 1, 2000" in the last sentence.

Chapter 8, Complete Reasoning, last paragraph, first footnote

"[5] Conflicts in our networks of belief occur when beliefs compete for the same function in our system of beliefs. Quine would have us settle these conflicts in the least disruptive way. This is consistent with the way the Europeans solved the problem created by the discovery of what they now call black swans. It is also consistent with choosing the EOQ model over the RTS model as a means of describing how best to set up tools. From the temporal view of modern science, the EOQ model is the more "scientific" model of setting up tools. In contrast, holes in our networks of beliefs emerge from the wholeness of our belief systems. From the "holistic" view of invariant science, the discovery of the usefulness of learning through experience in setting up tools exposes holes throughout our networks of beliefs. We fill these holes with beliefs that are consistent with solving the problems we face by learning through experience."

was deleted.

Chapter 8, Complete Reasoning, last paragraph, last footnote

"[5] Quine's concept of holism emerges from the way we induce general knowledge from experience, but not from the inexhaustibility of knowledge. From this view, *the philosophy of*

science is philosophy enough. In contrast, the multiplex concept of holism put forth in this work emerges not only from the way we induce general knowledge from experience, but also from the inexhaustibility of knowledge. It concerns not only the supply but also the demand side of the market for the Truth. From this view, *the philosophy of science is philosophy enough if and only if science includes the interwoven pursuits of all boundless factors of pursuing Wisdom*. The incompleteness of Quine's concept of holism gave rise to both Morton White's argument with Quine over the scope of holistic pragmatism and Jaegwon Kim's criticism of Quine's epistemology for not having a normative element. (From the multiplex view, the normative element missing from Quine's theory of knowledge is the teleonomic pursuit of the Good.)"

was changed to:

"[5] From the multiplex view, *the philosophy of science is philosophy enough if and only if science includes the interwoven pursuits of all boundless factors of pursuing Wisdom*. Completeness concerns both the supply and demand sides of the Truth market. From W. V. O. Quine's view, *the philosophy of science is philosophy enough*. Completeness concerns only the supply side of the Truth market. This shortfall gave rise to both Morton White's dispute with Quine over the scope of holistic pragmatism and Jaegwon Kim's criticism of Quine's epistemology for not having a normative element. It also blinded Quine to the problem of holes in our belief systems. His rule for settling conflicts by choosing the least disruptive alternative would have us choose the EOQ model over the RTS model as a tool for describing how best to set up tools."

Chapter 8, end

"**Summary**
The spirit of our age concerns breaking unwieldy wholes into parts in order to solve problems better. A major disadvantage of using this process is forgetting to consider the infinitely greater whole. Although definite knowledge of this whole will remain forever beyond our grasp, we must not pass over it in silence. When we expand the scope of the problems we face to the limits of imagination, a structure of invariant values emerges. Understanding the process by which we best progress toward these timeless ends can help us find better problems to solve. We shall not grow wiser before we learn that much that we have done was very foolish."

was returned. The lack of a closing to the last chapter highlighted the open-ended nature of pursuing Wisdom. However, I deemed the cost of breaking yet another convention was too high.

Appendix, Less is More, last paragraph, footnote, third and fourth sentences

"Just as the motions of a loom weave yarn into cloth, folding and smoothing parts of the line weave knowledge into networks of knowledge-in-use. Regrettably, we do not yet have the concepts we need to think clearly about the structure and dynamics of these networks, which

span our nervous systems, our symbolic systems, our organizational systems, and our technological systems."

were deleted.

Changes in Version 2012.08.29

Chapter 3, *Public Entropy*, first paragraph, last footnote

"[5] From the view of modern science, 'entropy' has several meanings that concern disorder, inefficiency, and unpredictability. Some are useful in studying energy and others in studying information. In 1827, James Clerk Maxwell imagined how an imaginary intelligent being, which Lord Kelvin called a "demon," could convert information into energy by sorting gas molecules by their kinetic energy. In 2010, a team of Tokyo scientists confirmed that it is possible to convert information into energy (Toyabe, S., Sagawa, T., Ueda, M. Muneyuki, E., & Sano, M. "Experimental demonstration of the information-to-energy conversion and validation of the generalized Jarznynski equality," *Nature Physics*, vol. 6, pp. 988–92). From the multiplex view, the concept of public entropy helps us explain the relation between information and energy in ways that are useful in helping us find problems to solve in pursuing Wisdom."

was changed to:

"[5] From the view of modern science, 'entropy' has several meanings. In physics, it is a measure of disorder; in thermodynamics, it is a measure of inefficiency; and in information theory, it is a measure of unpredictability. From the boundlessly pragmatic view of this work, 'entropy' has a generic meaning, which is waste in solving the problem that contains all other problems. From this public view, physical entropy is the negation of physical order useful in solving this problem; thermodynamic entropy is the negation of thermodynamic efficiency in solving this problem; and informational entropy is the negation of informational efficiency in solving this problem."

Appendix, Less is More, footnote

Changed "networks" to "invisible objects" in the last sentence.

Changes in Version 2012.08.30

Acknowledgments, last paragraph

Changed "Grinnell, Iowa" to "Grinnell, Iowa, a "new Jerusalem of the prairie" that was shocked by a major banking scandal in 1904" in the first sentence.

Changed "Management Control Directorate (Organizational Planning and Statistical Control Divisions) of the Army Air Force, who he believed ought to know better" to "Organizational Planning and Statistical Control Divisions of the Army Air Force Management Control Directorate" in the sixth sentence.

Preface, first paragraph

Changed "our actions" to "our actions, a not-yet-disproven method of telling the way forward" in the last sentence.

Preface, second to last paragraph

Changed "currently know rather" to "currently know, rather" in the last sentence.

Chapter 2, Invariant Tools for Living Well, last paragraph, footnote

"[2] The term 'multiplex view' comes from biologist Jack Cohen and mathematician Ian Stewart's book, *Figments of Reality: The Evolution of the Curious Mind* (Cambridge, England: Cambridge University Press, 1997). Cohen and Stewart describe a recursive evolutionary process that creates the need for ever more complex ways of thinking clearly. What is missing from this work is the symmetry of pursuing Wisdom, hence the convergence of approximate-multiplex mental views toward a transcendental view, which monotheists may call *a God's eye view*. Note that such convergence occurs only when our ability to think clearly about the world progresses faster than the complexity of the world, and that this complexity emerges not only from the symmetry of nature per se, but also from the broken symmetry of nature, which includes the broken symmetry of pursuing Wisdom. Foolishness makes the task of thinking clearly about the world doubly hard."

was changed to:

"[2] The term 'multiplex view' comes from biologist Jack Cohen and mathematician Ian Stewart's book, *Figments of Reality: The Evolution of the Curious Mind* (Cambridge, England: Cambridge University Press, 1997). Cohen and Stewart describe the evolution of intelligence as a recursive process. What is missing from this work is the symmetry of pursuing Wisdom, hence the convergence of approximate views toward a transcendental view, which monotheists may call *a God's eye view*."

Chapter 2, *Pleasure and Pain*, sixth paragraph, footnote, last sentence

"Note that this general definition can accommodate such modern theories as epigenetic development."

was deleted.

Chapter 2, Profit, first paragraph, footnote, last sentence

"As we shall see, violating our natural right to pursue Wisdom is a recipe for catastrophe."

was deleted.

Chapter 3, Contemplating the Way Forward, fifth paragraph, footnote

Changed "theory of objective truth in the physical sciences" to "theory of knowledge" in the first sentence.

Chapter 3, *Three Approaches to Policy*, second paragraph, last footnote, seventh and eighth sentences

"The process of finding problems to solve is at least as important as the process of solving problems. Further, the people best able to find problems are often the people closest to them."

were changed to:

"The process of finding problems to solve is not trivial. Further, the people best able to find problems and solve problems are often the people closest to them."

Chapter 3, *A Decision-Tree Interpretation of Quantum Mechanics*, first paragraph, footnote, last two sentences

"However, from the multiplex view, we ought to choose the research program that seeks to disprove the beautiful choice, which is that free will exists. This calls for us to act as if we believe that free will exists."

were changed to:

"From the multiplex view, we ought to choose the research program that seeks to disprove the beautiful choice, which is that free will exists. This program calls for us to act as if free will exists."

Chapter 4, Refining Everyday Thinking, fifth paragraph, footnote, last two sentences

"Note too that descriptions of the world may have their own logic. A classic example is quantum mechanics, which includes such apparently strange behaviors as objects that must rotate 360 degrees *twice* to return to their initial state."

were deleted.

Chapter 4, Refining Deciding Well, first paragraph, footnote, last sentence

"Hidden in theories that describe the world as it is in the process of becoming is a description of a prescriptive program: living things pursue the Good."

was changed to:

"Hidden in theories that describe the world as it is in the process of becoming is a description of what drives the system forward. From the multiplex view, this driver is the teleonomic program of all living things to pursue the Good."

Chapter 5, Sovereignty, last paragraph, footnote

Changed "pursuing the boundless factors of pursuing Wisdom" to "pursuing Wisdom" in the fourth sentence.

Chapter 5, *Lower Trade Barriers*, first paragraph, footnote

Changed "in 1815" to "in 1815 and refined by David Ricardo in 1817" in the last sentence.

Chapter 6, *Schweitzer's Universal Spiritual Need*, last paragraph, footnote

Moved the *Nicomachean Ethics* reference to the end of the first sentence.

Chapter 6, *Einstein's Twin Warnings*, first paragraph, footnote, last sentence

"Note that what Einstein calls science is modern science, not invariant science."

was deleted.

Chapter 7, *The Grandest Possible Strategy*, first paragraph

Changed "the story of pursuing Wisdom" to "that of pursuing Wisdom" in the last sentence.

Changes in Version 2012.08.31

Acknowledgments, second paragraph

Changed "Douglas" to "Douglass" in the seventh sentence.

Acknowledgments, last paragraph

Changed "sons of early-twentieth-century bankers" to "sons of bankers" and "was shocked by a major banking scandal in 1904" to "had been shaken by the scandalous collapse of its most prominent and trusted bank" in the first sentence.

Changed "three" to "three sons of Grinnell" in the second sentence.

Preface, second to last paragraph

Changed "on what they need" to "what they need" in the last sentence.

Preface, last paragraph, end

Added the sentences:

"Despite its simple style, most people will find it challenging. Those trained to classify reason will find it especially challenging. They have more to unlearn. Many will want to dismiss it as a timeless mishmash, as a disordered collection of ideas from all ages. It has order, but not the order that they have learned to expect. The reward for learning this new order, which is knowledge of how to find better problems to solve, is well worth the effort."

Chapter 6, *Heroic Death*, second paragraph

Changed "satisfy" to "pursue" in the last sentence.

Changes in Version 2011.09.03

Acknowledgments, last paragraph

Changed "most prominent and trusted bank" and "oldest and most trusted bank" in the first sentence.

Chapter 1, Steps for Building Multiple Frame Models , last paragraph, footnote, end

Added the sentences:

"According to the theory of language underlying this technique, we ought to be like pilots flying solely on instruments. This "instrumental" theory of how we ought to use language contradicts the theory that we ought to use language to picture the world exactly as it is. According to the most modern form of this "pictorial" theory of language, which is that of the early work of Ludwig Wittgenstein, we ought to be like painters using a *camera obscura* to record a scene well. For more on the difference between the instrumental and pictorial theories of language, see the last chapter."

Chapter 2, Invariant Tools for Pursuing Wisdom, last paragraph

Changed "the multiple-frame mental view" to "the "view" of a multiple-frame model" in the last sentence.

Chapter 2, Invariant Tools for Pursuing Wisdom, last paragraph, footnote, last two sentences

"Cohen and Stewart describe the evolution of intelligence as a recursive process. What is missing from this work is the symmetry of pursuing Wisdom, hence the convergence of approximate views toward a transcendental view, which monotheists may call *a God's eye view*."

were changed to:

"In this book, Cohen and Stewart describe the evolution of intelligence as a recursive process, but miss the symmetry of deciding well."

Chapter 5, Tax Well, first paragraph

Changed "a person who pursues" to "people who pursue" in the last sentence.

Chapter 5, Liberalism, third paragraph

Changed "Nothing" back to "In the long run, nothing" in the last sentence.

Chapter 6, *Worldly Benefits of Detachment*, first paragraph

Changed "the world and life" to "them" in the last sentence.

Chapter 8, Useful Reasoning, last paragraph, footnote, first four sentences

"Students of Western thought may better understand the distinction between logic, dialectics, and Reason by studying Ludwig Wittgenstein's conversion from a picture theory of language, which he based on an explicitly temporal view of the world, to an instrumental theory of language, which he based on a biological concept of everyday thinking. Wittgenstein came to believe that the goal of understanding language was to help people live good lives. In his words, it was to "show the fly the way out of the fly-bottle." In contrast to this biological goal, the public goal of understanding language is to help people pursue Wisdom."

were changed to:

"Students of Western thought may better understand the distinction between logic and dialectics by studying Ludwig Wittgenstein's conversion from a picture theory of language based on a temporal view of the world to an instrumental theory of language based on the timeless end of living well. In his words, he came to believe that the goal of language was to "show the fly the way out of the fly-bottle.""

Chapter 8, Summary, first paragraph, last sentence

Inserted the following sentence:

"Perfection of means and confusion of ends characterize our age."

Appendix, Less is More, first paragraph, footnote

Changed "these invisible objects" to "the invisible objects in these networks" in the last sentence.

Changes in Version 2011.09.05

Chapter 5, *A Sovereign Story for Pursuing Wisdom*, first paragraph

Changed "civil faith, what set of publicly proclaimed and practiced beliefs beyond reason," and "set of publicly proclaimed and practiced beliefs" in the last sentence.

Chapter 6, *Heroic Death*, last paragraph

Changed "or do we learn" to "or" in the second sentence.

Chapter 6, A Common Timeless End, first paragraph, fifth sentence

"Which of these views is true currently is a matter of faith, a matter of belief beyond reason."

was deleted.

Chapter 7, *A Normal Anomaly*, last paragraph

Changed "game theory" to "modern game theory" in the last sentence.

Changes in Version 2011.09.10

Acknowledgments, last paragraph

Changed "from Grinnell, Iowa, " to "from " and "oldest and most trusted bank" to "most trusted bank in 1904" in the first sentence.

Changed "Grinnell" to "Grinnell, Iowa" in the second sentence.

Preface, sixth paragraph

Changed "the division of labor and the expansion of market size" to "Adam Smith's virtuous circle" in the last sentence.

Preface, last paragraph, last sentence

"The reward for learning this new order, which is knowledge of how to find better problems to solve, is well worth the effort."

was deleted.

Chapter 1, *The EOQ/RTS Example*, fourth paragraph

Changed "quickly" to "efficiently" in the sixth sentence (2 occurrences).

Chapter 1, *The Need for Timeless Frames*, first paragraph

Changed "expensive" to "costly" in the first sentence of the first bullet point.

Changed "produce good quality" to "make good quality products" in the last sentence of the first bullet point.

Changed "things" to "products" in the first and last sentences of the second bullet point (2 occurrences).

Inserted the following sentence into the third bullet point:

"Larger products are more costly to package, transport, store, and recycle."

Chapter 1, Temporal versus Invariant Values, second paragraph

Changed "greater than ourselves" to "infinitely greater than ourselves" in the last sentence.

Chapter 1, *Ever More Complete Multiple-Frame Models*, first paragraph

Added the following footnote:

"[13] The pursuit of living well concerns our internal (teleonomic) programming. Given the critical importance of our need for spiritual wholeness and the difficulty of testing our beliefs about this need, we ought to consider this need separately. Among other things, this will allow us to reconcile materialist and dualist means of satisfying this need."

Chapter 2, *Three Common Mistakes*, second paragraph

Changed "greater than ourselves" to "infinitely greater than ourselves" in the last sentence.

Chapter 3, *Three Approaches to Policy*, third paragraph, second to last sentence

Added the following footnote:

"[5] Note the modern link between the timeless approach to overcoming constraints and the biological approach to policy. Implicit in this link is the belief that the natural timeless end is the timeless end of living well (the Good), which will remain forever beyond our understanding. From the multiplex view, the natural timeless end is the timeless end of deciding well (Wisdom), which all living beings naturally pursue, some more successfully than others. Purveyors of modern thought have replaced the idea of pursuing Wisdom with the idea of Darwinian evolution. They have replaced the holistic idea of competing well in order to cooperate well with the reductionist idea of cooperating well in order to compete well. For more on this, see the last two chapters."

Chapter 5, *The Explicit Experiment*, last paragraph

"How do the people of the United States who think deeply about governing well reconcile the idealistic story of the Declaration with the pragmatic story of the Constitution? One popular way is to claim that the Declaration story concerns justice and the Constitution story concerns legality. This affirms a theistic source of justice higher than the social contract. Another popular way is to claim that the Declaration story has become ritual and non-theistic through long customary use. This denies a theistic source of justice higher than the social contract. From the multiplex view, both of these ways violate the spirit, if not the letter, of the First Amendment. The first way establishes a state religion based on the pursuit of theistic justice and the second establishes a state religion based on the pursuit of social justice.[9]"

was changed to:

"How do the people of the United States who think deeply about governing well reconcile the idealistic story of the Declaration with the pragmatic story of the Constitution? One popular way is to claim that the Declaration story has become ritual and non-theistic through long customary use. This denies a source of justice higher than the social contract. Another popular way is to claim that the Declaration story concerns justice and the Constitution story concerns legality. To people who believe that the Declaration story concerns theistic rather than natural religion, this affirms a theistic source of justice higher than the social contract. From the multiplex view, both of these ways violate the spirit, if not the letter, of the First Amendment. The first way establishes a state religion based on the pursuit of social justice and the second establishes a state religion based on the pursuit of theistic justice.[9]"

Chapter 5, *The Explicit Experiment*, last paragraph, footnote

Changed "mortal danger" to "mortal danger by promoting policies that go beyond the natural religion of the Declaration of Independence" in the last sentence.

Chapter 5, *A Sovereign Story for Pursuing Wisdom*, last paragraph

Changed "sovereign rights story" to "story" in the third sentence.

Changed "(the Good)" to "(a whole life lived well)" in the second sentence of the first footnote.

Chapter 6, A Common Timeless View, first paragraph

Changed "From both," to "From both views," in the fourth sentence.

Chapter 7, *Boyd's Grand Strategy*, last paragraph, end

Added the following footnote:

"[16] Boyd saw self-similar patterns in the way we compete to live well. He wanted to capture these patterns in a universal model that included learning-by-doing. For this universal model to be logically complete, it must apply to itself. For it to apply to itself, it must be a less than perfect approximation of itself, which is a logical contradiction. For more on logical completeness and consistency, see the next chapter."

Chapter 8, Complete Reasoning, first paragraph

Changed "cycle" to "thought-experiment cycle" in the last sentence.

Chapter 8, Complete Reasoning, last paragraph

"The multiple-frame model of pursuing Wisdom consists of an unknown number of incomplete frames. In theory, it provides us with a structure for thinking about not only the conflicts in our networks of beliefs, but also all holes in these networks. Hence, we may call it *reasonably complete*.[5]"

"[5] From the multiplex view, *the philosophy of science is philosophy enough if and only if science includes the interwoven pursuits of all boundless factors of pursuing Wisdom*. Completeness concerns both the supply and demand sides of the Truth market. From W. V. O. Quine's view, *the philosophy of science is philosophy enough*. Completeness concerns only the supply side of the Truth market. This shortfall gave rise to both Morton White's dispute with Quine over the scope of holistic pragmatism and Jaegwon Kim's criticism of Quine's theory of knowledge for not having a normative element. It also blinded Quine to the problem of holes in our belief systems. His rule for settling conflicts by choosing the least disruptive alternative would have us choose the EOQ model over the RTS model as a tool for describing how best to set up tools."

was changed to:

"Multiple-frame models of pursuing Wisdom provide us with structures for thinking about not only conflicts but also holes in our networks of beliefs. Hence, we may call them *reasonably complete*.[5]"

"[5] Consider the holism of W. V. O. Quine. From Quine's view, *the philosophy of science is philosophy enough*. Our concept of completeness concerns the supply side of the Truth market. We see conflicts in our belief systems. Our rules for settling these conflicts (prefer easy to accept and easy to use models), would have us choose the EOQ over the RTS model as a tool for describing how best to set up tools. Now consider the holism of the multiple-frame model of pursuing Wisdom. From the multiplex view, *the philosophy of science is philosophy enough if and only if science includes the interwoven pursuits of all boundless factors of pursuing Wisdom*. Our concept of completeness concerns both the supply and demand sides of the Truth market. We see holes as well as conflicts in our belief systems. We prefer the RTS to the EOQ model as a tool for describing how best to set up tools. Further, we believe that Morton White was right to criticize Quine's pragmatism for being too narrow and that Jaegwon Kim was right to criticize Quine's theory of knowledge for not having a normative element."

Chapter 8, Natural Reasoning, last paragraph

Changed "view" to "reductionist view" in the third sentence.

Changed "multiplex view" to "holistic view of this work" in the last sentence.

Changes in Version 2011.09.12

Chapter 3, *Three Approaches to Policy*, third paragraph, footnote

"[5] Note the modern link between the timeless approach to overcoming constraints and the biological approach to policy. Implicit in this link is the belief that the natural timeless end is the timeless end of living well (the Good), which will remain forever beyond our understanding. From the multiplex view, the natural timeless end is the timeless end of deciding well (Wisdom), which all living beings naturally pursue, some more successfully than others. Purveyors of modern thought have replaced the idea of pursuing Wisdom with the idea of Darwinian evolution. They have replaced the holistic idea of competing well in order to cooperate well with the reductionist idea of cooperating well in order to compete well. For more on this, see the last two chapters."

was changed to:

"[5] Note the modern link between the timeless approach to overcoming constraints and the biological approach to policy. Implicit in this relation is the belief that the natural timeless end is the timeless end of living well. From the multiplex view, the natural timeless end is the timeless end of deciding well, which all living beings naturally pursue, some much more successfully than others. Purveyors of modern thought have replaced ancient stories of pursuing the timeless end of deciding well (e.g., pursuing the Tao, Sophia, or Logos) with the modern story of survival of the fittest. They have replaced the holistic idea of competing well

in order to cooperate well with the reductionist idea of cooperating well in order to compete well. For more on this, see the last two chapters."

Chapter 3, The Elephant in the Room, first paragraph

Changed "multiple-frame model" to "multiple-frame model of pursuing Wisdom" in the first sentence.

Chapter 3, The Elephant in the Room, third paragraph

"The essential theological explanation of this coincidence is as simple and straightforward. The Creator created us with the need to seek the Good, the Truth, Justice, Wisdom, and Beauty. We pursue these invariant values by deciding well. We collectively refine our means of deciding well by deciding well over time. Deciding well and our understanding of deciding well co-evolve."

was changed to:

"The essential theological explanation of this coincidence is as simple and straightforward. The Creator created what we call the laws of nature. These include the need for life to survive and thrive. Life flourishes by deciding well. As people, we collectively refine our means of deciding well by deciding well over time. Deciding well and our understanding of deciding well co-evolve."

Chapter 7, *A Natural Anomaly*, last paragraph

Merged this paragraph with the preceding paragraph.

Changes in Version 2011.09.15

Title Page, subtitle

Changed "An Invariant View of Deciding Well" to "An Invariant Approach to Deciding Well."

Chapter 1, Useful Frames, third paragraph, footnote

Changed "Hence" to "Thus" in the last sentence.

Chapter 1, *The EOQ/RTS Example*, sixth paragraph

Changed "American firms" to "American firms did" in the fourth sentence.

Chapter 1, *The Need for Timeless Frames*, first paragraph

Changed "timeless frame" to "timeless frame of deciding well" and "temporal one" to "temporal frame of producing well" in the third sentence.

Changed "themselves" to "deciding well" in the second sentence of the first bullet point.

Chapter 1, *The Need for Timeless Frames*, last paragraph

Changed "temporal versus invariant values" to "the values we use to help us decide" in the last sentence.

Chapter 1, Temporal versus Invariant Values, title

Changed title to "Values."

Chapter 1, Values, fifth paragraph, footnote

Changed "reason (means independent of fact)" to "meanings" in the first sentence.

Chapter 1, *Steps for Building Multiple-Frame Models*, last paragraph, footnote

"The technique of reducing complex wholes to multiple frames opens more of our ability to recognize patterns to reason, thereby helping us better integrate these two abilities. According to the theory of language underlying this technique, we ought to be like pilots flying solely on instruments. This "instrumental" theory of how we ought to use language contradicts the theory that we ought to use language to picture the world exactly as it is. According to the most modern form of this "pictorial" theory of language, which is that of the early work of Ludwig Wittgenstein, we ought to be like painters using a *camera obscura* to record a scene well. For more on the difference between the instrumental and pictorial theories of language, see the last chapter."

was changed to:

"The technique of reducing complex wholes to multiple frames opens more of our ability to recognize patterns to reason, thereby helping us better integrate these two abilities. According to the theory of language underlying this technique, we ought to be like pilots flying on instruments. This "instrumental" theory of how we ought to use language contradicts the theory that we ought to use language to picture the world exactly as it is. According to the most modern form of this "pictorial" theory of language, which is that Ludwig Wittgenstein's 1921 work, *Tractatus Logico-Philosophicus*, we ought to be like painters using a *camera obscura* to record a still-life scene well. For more on the difference between the instrumental and pictorial theories of language, see the last chapter."

Chapter 1, *Ever More Complete Multiple-Frame Models*, sixth paragraph, footnote

"In theory, each new frame we add to the multiple-frame model of pursuing Wisdom yields a better model for pursuing Wisdom. In practice, the marginal costs of using models that are

more complete can outweigh the marginal benefits of using these models. Just as classical mechanics is often a good enough tool for helping us solve problems, a multiple-frame model of pursuing Wisdom that includes only the Good, the Truth, Justice, and Beauty is often a good enough tool for helping us find problems to solve."

was changed to:

"Logical completeness is a means to efficiency, not an end in itself. In seeking to disprove the proposition that all crows are black, we ought to search for crows that are not black. To search for non-black things that are crows would be a foolish use of resources. In theory, each new frame we add to the multiple-frame model of pursuing Wisdom yields a better model for pursuing Wisdom. In practice, the marginal costs of using models that are more complete can outweigh the marginal benefits of using them. Just as classical mechanics is often a good enough tool for helping us solve problems, a multiple-frame model of pursuing Wisdom that includes only the Good, the Truth, Justice, and Beauty is often a good enough tool for helping us find problems to solve."

Chapter 1, *Ever More Complete Multiple-Frame Models*, last paragraph

"The most obvious benefit of this multiple-frame approach is that it allows us to use more of what we know about the world than any single-frame approach does. A less obvious benefit is that it provides us with a more robust means of learning by doing. Like the Toyota system, it helps us break down overwhelmingly complex problems into problems we can solve."

was changed to:

"***Invariant Values***
An obvious benefit of this multiple-frame approach to deciding well is that it allows us to use more of what we currently know about the world than any single-frame approach does. A less obvious benefit is that it provides us with a more robust means of learning by doing. Like the Toyota system, it helps us break down overwhelmingly complex problems into problems we can solve. Another less obvious benefit is that it extends the invariance of pursuing the timeless end of living well to pursuing all boundless factors of deciding well. The boundless factors of deciding well are the values we need to best solve the problem that contains all other problems.[16] To choose other than these invariant values is to choose to aim at something less than Wisdom. To choose other than these values is to choose to decide foolishly."

"[16] Note that we can be more certain about which *approaches* are best than we can about which *methods* are best. Consider the problem of determining the value of π. We can be more certain that the recursive approach to determining the value of π best solves this problem than we can that we have found the best method of solving it. Now consider the problem of pursuing the timeless end of believing well. We can be more certain that the multiple-frame approach to deciding well best solves this problem than we can that we have found the best method of solving it. As we shall see, Kurt Gödel's belief in an *a priori* approach to science was ahead of its time."

Chapter 3, *Three Approaches to Policy*, third paragraph, footnote

Changed "pursuing the Tao, Sophia, or Logos" to "following the *Tao* or *Logos*" in the fourth sentence.

"[5] Note the modern link between the timeless approach to overcoming constraints and the biological approach to policy. Implicit in this link is the belief that the natural timeless end is the timeless end of living well (the Good), which will remain forever beyond our understanding. From the multiplex view, the natural timeless end is the timeless end of deciding well (Wisdom), which all living beings naturally pursue, some more successfully than others. Purveyors of modern thought have replaced the idea of pursuing Wisdom with the idea of Darwinian evolution. They have replaced the holistic idea of competing well in order to cooperate well with the reductionist idea of cooperating well in order to compete well. For more on this, see the last two chapters."

Chapter 3, *A Decision-Tree Interpretation of Quantum Mechanics*, last paragraph

Changed "know about physics" to "believe we know" in the third sentence.

Chapter 5, Tax Well, first paragraph

Changed "Hence" to "Thus" in the last sentence.

Chapter 5, Liberalism, fourth paragraph

"Unlike invariant liberalism, these two temporal forms of liberalism use the temporal concept of excellence in means to help us find problems to solve. As we saw in the EOQ/RTS example, this tends to blind us to learning. It also tends to blind us to the problem of embedding mistakes into our networks of knowledge-in-use, which not only slows progress but also leads to debacles, the sudden release of large amounts of "frozen" stress."

was deleted.

Chapter 7, The Scope of Competing Well, first paragraph

Changed "none of us is" to "all of us are" in the second sentence.

Chapter 8, Useful Reasoning, last paragraph

Changed "language" to "his later work in the philosophy of language" in the second sentence.

Chapter 8, Complete Reasoning, first paragraph, last sentence

"We may continue this thought-experiment cycle of ever-increasing completeness until we arrive at the model for addressing the problem that includes all other problems, which is the multiple-frame model of pursuing Wisdom put forth in this work."

was changed to:

"To prove that this model is complete, we need a still more complete model. At the limit of this process of ever-increasing completeness are models of the problem that contains all other problems, which is the problem that multiple-frame models of pursuing Wisdom address."

Chapter 8, Complete Reasoning, second paragraph, footnote

Changed "pragmatism" to "philosophy" and "Quine's theory of knowledge" to "it" in the last sentence.

Changes in Version 2011.09.20

Acknowledgments, second paragraph

Changed "career to choose" to "to do" in the seventh sentence.

Preface, fourth paragraph

Changed "model of" to "multiple-frame approach to" in the first sentence.

Changed "model" to "approach" in the second.

Chapter 1, *The EOQ/RTS Example*, fourth paragraph

Changed "We may model rapid tool setting by combining" to "The rapid tool setting model combines" in the first sentence.

Changed "model" to "problem" in the fourth sentence.

Chapter 1, *Ever More Complete Multiple-Frame Models*, fourth paragraph

Changed "simple model" to "template" in the first sentence.

Changed "Extending this model to all people" to "Applying this template to people pursuing Wisdom" and "periods in pursuing Wisdom" to "periods" in the second sentence.

Chapter 1, *Ever More Complete Multiple-Frame Models*, last paragraph, footnote

Changed "be a foolish use of" to "waste" in the third sentence.

Changed "the multiple-frame model" to "a multiple-frame model" in the fourth sentence.

Added the following sentence to the end of the footnote: "For more on logical completeness, see the last two chapters."

Chapter 1, Values, fourth paragraph

Changed "induce the belief" to "believe" in the sixth sentence.

Inserted the following sentence after the sixth sentence:

"To believe we can is to ignore the possibility that believing that all marbles in the urn are white introduces the possibility of error into our networks of knowledge in use."

Moved the remaining sentences to the next paragraph.

Chapter 1, *Invariant*, first paragraph

Changed "pursuing the timeless end of living well to pursuing all boundless factors" to "pursuing the timeless end of living well to pursuing all boundless factors" in the fourth sentence.

Chapter 2, Invariant Tools for Deciding Well, first paragraph

Changed "model of pursuing Wisdom" to "approach to pursuing Wisdom" in the third sentence.

Chapter 2, Invariant Tools for Living Well, last paragraph

Changed "a multiple-frame model of" to "the multiple-frame approach to" in the last sentence.

Chapter 2, A Strategy for Learning Well, first paragraph

Changed " pursue this virtuous circle well by deciding well using the multiple-frame model of" to "best pursue this virtuous circle by using the multiple-frame approach to" in the last sentence.

Chapter 3, Pursuing the Ring of Truth, first paragraph

Changed "model of pursuing Wisdom" to "approach to pursuing Wisdom" in the first sentence.

Chapter 3, Pursuing the Ring of Truth, second paragraph

Changed "model of pursuing Wisdom" to "approach to pursuing Wisdom" in the third sentence.

Chapter 3, *Three Approaches to Policy*, first paragraph

Changed "model of pursuing Wisdom" to "approach to pursuing Wisdom" in the second sentence.

Chapter 3, *Three Approaches to Policy*, last paragraph

Changed "deciding well using the multiple-frame model of" to "using the multiple-frame approach to" in the fourth sentence.

Chapter 3, The Elephant in the Room, first paragraph

Changed "deciding well using the multiple-frame model of" to " using the multiple-frame approach to" in the first sentence.

Chapter 4, Refining Everyday Thinking, last paragraph, footnote

Changed "Kuhn" to "The modern scientists Kuhn studied" in the fourth sentence.

Chapter 4, *Two Types of Ignorance*, first paragraph

Changed "seeking to rid ourselves of ever more ignorance" to "pursuing the timeless end of believing well" in the third sentence.

Chapter 4, *Two Types of Ignorance*, second paragraph

"There exist extremes in which this method of testing models does not work. At the largest problem-scale level there is nothing left to learn, thus no need for models that help us predict or explain. About this level, of which we can speak only in terms that we define tautologically, we can say nothing that is useful in pursuing Wisdom."

was changed to:

"At the largest level of abstraction that we can imagine, the level of transcendent ends, there is nothing left to learn, hence no need for models that help us predict or explain on this level."

Chapter 4, *Two Types of Ignorance*, last paragraph

"At the smallest possible problem-scale level, we have no need to find problems to solve on a smaller problem-scale level, hence no need to explain causation. All of our ignorance on this level is in the form of uncertain predictions. For example, if the problem-scale level of quantum mechanics is the smallest possible problem-scale level, we have no need to find

problems to solve on a smaller problem-scale level, hence no need to explain causation on the level of quantum mechanics. On the other hand, if the problem-scale level of quantum mechanics is not the smallest possible problem-scale level, we have a need to find problems to solve on a smaller level, hence the need to explain causation on the level of quantum mechanics. From a hidden-variables view of quantum mechanics, we ought to search smaller problem-scale levels for models that explain causation on the level of quantum mechanics. From a decision-oriented view of quantum mechanics, we ought to search smaller problem-scale levels for models that both explain causation on the level of quantum mechanics *and best help us pursue Wisdom*. More than one explanation may fit what we can sense.[4] We ought to choose the explanation that best helps us pursue Wisdom.[5]"

"[4] In philosophical terms, facts are theory-laden and theories that we use to explain are underdetermined by facts."

was changed to:

"At the smallest level of abstraction that we can imagine, we cannot explain causation at a lower level. From the view of the Copenhagen class of interpretations of quantum mechanics, quantum mechanics is the lowest level of abstraction that we can imagine. Searching for models that explain causation on the level of quantum mechanics at a lower level is a waste of resources. From the view of the hidden-variables class, we can imagine levels of abstraction lower than the level of quantum mechanics. Searching for models that explain causation on the level of quantum mechanics at a lower level may not be a waste of resources. From the view of the decision class, we ought to search lower levels for models that explain causation on the level of quantum mechanics *wisely*. More than one explanation may fit what we can sense.[4] We ought to choose among these the explanation that best helps us pursue Wisdom.[5]"

"[4] In philosophical terms, (theory-laden) facts underdetermine the theories that we use to explain causation."

Chapter 4, Useful Reminders, first paragraph, last sentence

"In theory, it also calls for us to consider these timeless ends in even our smallest decisions."

was deleted.

Chapter 4, Useful Reminders, last paragraph

Changed "this approach" to "the multiple-frame approach to pursuing Wisdom" in the second sentence.

Chapter 5, *A Sovereign Story for Pursuing Wisdom*, second paragraph

Changed "model, the multiplex view" to "template, the multiple-frame approach to pursuing Wisdom" in the first sentence.

Chapter 5, Public Policies, first paragraph, second and third sentences

"One key factor in deciding well is the freedom to decide. Sixty years ago, F. A. Hayek used the simple fact that we are not able to express much useful knowledge to explain why people closest to problems ought to be free to decide what to do.[12] Only people closest to problems can use the knowledge that they are not able to express."

was changed to:

"We are not able to express much useful knowledge. Only people closest to problems can use the knowledge that they are not able to express. To use this knowledge, people closest to problems need to be free to decide what to do.[12]"

Chapter 6, A Common End, first paragraph

Changed "deciding well using the multiple-frame model of pursuing Wisdom" to "the multiple-frame approach to pursuing Wisdom" in the first sentence.

Changed "view of deciding well using the multiple-frame model of pursuing Wisdom" to "view" in the second sentence.

Chapter 8, Useful Reasoning, last paragraph

Changed "decide well using the multiple-frame model of" to "use the multiple-frame approach to" in the first sentence.

Changed "all boundless factors of pursuing Wisdom" to "timeless ends" in the first sentence.

Changed "deciding well using the multiple-frame model of" to "using the multiple-frame approach to" in the third sentence.

Chapter 8, Complete Reasoning, first paragraph, footnote

Changed "multiplex model of pursuing Wisdom" to "multiple-frame approach to pursuing Wisdom" in the second sentence.

Chapter 8, Complete Reasoning, second paragraph, footnote

Changed "multiple-frame model of pursuing Wisdom" to "multiple-frame approach to pursuing Wisdom" in the fifth sentence.

Changes in Version 2011.09.24

Acknowledgments, last paragraph

Changed "Jerusalem of the prairie" to "Jerusalem" in the first sentence.

Changed "secretaries" to "secretaries (1949–59)" in the third sentence.

Changed "Directorate" to "Directorate (1942–6)" in the fifth sentence.

Preface, third paragraph, second through fifth sentences

"Over time, we collectively learn that (1) we ought to pursue factors of deciding well only to the point that they are useful to us; (2) there exist universally useful and inexhaustible factors of deciding well that we can never have in excess; and (3) the endless pursuits of all of these "boundless factors" intertwine to form a single endless pursuit. The first two of these lessons are widely known. The third calls for a formal argument:"

were changed to:

"Over time, we collectively learn that there exist universally useful and inexhaustible factors of deciding well that we can never have in excess. Further, we learn that the endless pursuits of all of these "boundless factors" intertwine to form a single endless pursuit:"

Chapter 1, *Building Multiple-Frame Models*, last paragraph

Changed "both" to "our current beliefs about" in the first sentence.

Changed "allows us to think about complex phenomena more clearly" to "provides us with a more robust means of learning by doing. Like the Toyota system, it helps us break down overwhelmingly complex problems into problems we can solve" in the last sentence.

Changed "on instruments" to "on instruments through a storm front" in the second sentence of the footnote.

Chapter 1, *Ever More Complete Multiple-Frame Models*, last paragraph

Changed "beliefs about the boundless factors of deciding well" to "current beliefs about the boundless factors of pursuing Wisdom" and "rings true" to "rings true with what we currently believe we know about pursuing Wisdom" in the third sentence.

Changed "found" to "found what appears to us to be" in the last sentence.

Chapter 1, *Ever More Complete Multiple-Frame Models*, last paragraph, footnote, first two sentences

"Logical completeness is a means to efficiency, not an end in itself. In seeking to disprove the proposition that all crows are black, we ought to search for crows that are not black. To search for non-black things that are crows would be a foolish use of resources."

were moved to in front of the last sentence.

Chapter 1, *Invariant Values*, first paragraph, second through fifth sentences

"A less obvious benefit is that it provides us with a more robust means of learning by doing. Like the Toyota system, it helps us break down overwhelmingly complex problems into problems we can solve. Another less obvious benefit is that it extends the invariance of the timeless end of living well to all boundless factors of deciding well. The boundless factors of deciding well are the values we need to best solve the problem that contains all other problems."

were changed to:

"A less obvious benefit is that it extends the invariance of the timeless end of living well to all boundless factors of deciding well. The boundless factors of deciding well are the values we need best to solve the problem that contains all other problems."

Chapter 1, *Invariant Values*, first paragraph, footnote, last sentence

"As we shall see, Kurt Gödel's belief in an *a priori* approach to science was ahead of its time."

was deleted.

Chapter 3, *Three Approaches to Policy*, first paragraph

Changed "multiplex view of" to "view of" in the second sentence.

Chapter 3, *Public Entropy*, first paragraph, footnote

Changed "has a generic meaning, which is" to "means" in the third sentence.

Changed "From this public view, physical entropy" to "Physical entropy" in the last sentence.

Chapter 4, *Two Types of Ignorance*, last paragraph, last footnote

"[5] From the multiplex view, invariant science is a self-similar, self-referential process that includes its own metascience."

was changed to:

"[5] From the multiplex view, pursuing Wisdom is a self-similar, self-referential process. Invariant science contains its own metascience."

Chapter 7, *A Normal Anomaly*, last paragraph

"To understand why these expert players reacted to Hofstadter's game as they did, one must understand something of modern game theory. Game theory is the analytical study of strategic situations. To draw conclusions from models of strategic situations, modern game theorists make two sorts of simplifying assumptions. The first is that the game occurs only once. This yields temporal models. The second is that the same game occurs repeatedly. This yields timeless models that are symmetric in a way that we can use the knowledge that we learn from each game. Hofstadter created a clever anomaly to modern game theory by creating a temporal model that is symmetric in a way that we cannot use the knowledge that we learn from each game. In doing so, he built a model that does not fit neatly into modern game theory. It falls between the cracks of modern game theory."

was changed to:

"To understand why these experts reacted to Hofstadter's game as they did, one must understand something of modern game theory. Game theory is the analytical study of strategic situations. To draw conclusions from their models, modern game theorists build their models in ways that restrict learning by doing. One way they do this is to assume that the situation concerns a game that occurs once. This excludes all learning by doing. Another way they do this is to assume that the situation involves recurring symmetrical games. This excludes all learning except learning from playing symmetrical games. Hofstadter created a model in which there are symmetrical games in a situation that occurs only once. This model does not fit neatly into modern game theory."

Chapter 7, *A Revolutionary Anomaly*, first paragraph

"Martin Gardner's claim that he was unable to behave rationally and Hofstadter's claim that his game shows the superiority of what he calls *superrational societies*, societies in which people compete well by considering symmetry before choosing a strategy,[8] hint at a far greater anomaly. Considering symmetry in strategic situations does not fit current models of reasoning well. It falls between the cracks of modern reason."

was changed to:

"Hofstadter believed that people ought to look for common ground, for symmetries on which to cooperate. He imagined that somewhere in the universe there exist *superrational societies*, societies in which people compete well by finding such common ground.[8]"

Chapter 7, *A Revolutionary Anomaly*, second paragraph

"From the multiplex view, playing games well calls for a grander concept of reason. Playing games well is a matter of choosing the best frame for what we perceive is the given strategic situation. We best frame this problem by making the problem of framing this problem part of the problem we are trying to solve. This creates an endless loop: How do we choose the best frame? We choose the frame that best helps us decide well. How do we choose the best frame for choosing the best frame? We choose the frame that best helps us decide well. How do we choose the best frame for choosing the best frame for choosing the best frame? We choose

the frame that best helps us decide well... Regardless of how many times we cycle through this endless loop, the answer is always that we choose the frame that best helps us decide well. From a purely logical view, this gets us nowhere. Each time we cycle through the loop, we end up back at our starting point. However, from the multiplex view, each time we cycle through this loop, we expand the scope of the problem we are seeking to solve. This is consistent with Dwight Eisenhower's maxim: "If a problem cannot be solved, enlarge it." Taking this advice to its logical limit, we end with the problem that contains all other problems. We best address this universal problem by pursuing Wisdom. Pursuing Wisdom calls for us to consider the symmetry of pursuing Wisdom before choosing a strategy. It calls for a grander concept of reason, a concept of reason in which all problems are part of the problem that contains all problems. People who base their decisions on temporal values, values based on the false belief that it is possible to separate problems from the problem that contains all other problems, act irrationally."

was changed to:

"From the multiplex view, Hofstadter was right to have people look for common ground, but he failed to find it in the symmetry of pursuing Wisdom. Pursuing Wisdom calls for a grander concept of reason, a concept of reason in which all problems are part of the problem that contains all problems. People who base their decisions on temporal values, values based on the false belief that it is possible to separate problems from the problem that contains all other problems, act irrationally."

Chapter 7, *Boyd's Grand Strategy*, last paragraph, footnote, last sentence

Inserted the sentences:

"Boyd addressed this problem by embracing a pragmatic approach to believing well based on what we currently believe we know about the world. We see this sophistry most clearly in his essay, *Destruction and Creation*."

Chapter 8, Summary, first paragraph

Changed "whole" to "whole, which tends to blind us to the wisdom of learning by doing" in the second sentence.

Changes in Version 2011.09.26

Chapter 3, Contemplating the Way Forward, third paragraph

Changed "simple recursive process" to "recursive process that ends" in the second sentence.

Changes in Version 2011.09.30

Title Page, subtitle

Changed "An Invariant Approach to Deciding Well" to "An Invariant Strategy for Deciding Well."

Chapter 1, Choosing Frames Well, last paragraph, last two sentences

"We cannot solve this infinitely large problem. However, we can address it by making it part of the problem of deciding well."

were changed to:

"We cannot solve this infinitely large problem, but we can address it by making it part of the problem of deciding well. In the words of Dwight Eisenhower, "If a problem cannot be solved, expand it."

Chapter 1, Values, fourth paragraph

Changed ". However," to ", but" in the fifth and sixth sentences.

Chapter 1, Values, fourth paragraph, last sentence

"To believe we can is to ignore the possibility that believing that all marbles in the urn are white introduces the possibility of error into our networks of knowledge in use."

was deleted.

Chapter 1, Values, last paragraph

Changed "However" to "In contrast" in second sentence.

Chapter 3, *Three Approaches to Policy*, first paragraph

Changed "false claim" to "claim" in the third sentence.

Chapter 3, *Three Approaches to Policy*, last paragraph

Changed "using the multiple-frame" back to "deciding well using the multiple-frame" in the fourth sentence.

Chapter 3, *Public Order*, last sixth paragraphs

"We may use an example of a cycling race to imagine the results of each of these types of public order. Imagine a team time trial in which we measure excellence by the average time it takes twelve team members to complete a two hundred kilometer course. During this event, team members can interact only with one another and not with members of other teams. Cycles must have two wheels, cannot have a seat closer to the ground than the top of the largest wheel, cannot have windscreens of any type, and cannot exceed two meters in length.

"A team taking an engineering approach would reduce the problem of ordering themselves to a set of problems that they can address using what they currently know. The simplest solution would be to choose a single public order for all conditions along the course. A refinement would be to choose different public orders for different conditions. There might be an order for moving over flat terrain, another for moving up hills, and a third for moving down hills. Another refinement would be to develop procedures for rotating cyclists from more tiring positions to less tiring positions as they become tired. Over time, the team would refine their ability to maintain orders and to shift between these orders. An accomplished team taking this approach would resemble an expert military drill team.

"A team taking a biological approach would invent ever better rules for overcoming constraints through their experiences and the experiences of others. For example, team members would develop rules for drafting behind one another. An accomplished team taking this approach would resemble a school of fish or a flock of birds.

"A team taking a public approach would distinguish between the tactical end of cycling well based on what they currently know and the strategic end of deciding well. In addressing the tactical problem, the team would choose to make the best use of current resources in addressing the problem of cycling well. In addressing the strategic problem, the team would seek ever better means of replacing non-knowledge resources useful in deciding well with knowledge resources useful in deciding well. Hence, it would consider technological as well as organizational changes. One such change would be the combination of regenerative braking and boosting motors. This combination would allow cyclists to store otherwise wasted energy from cycling downhill to use when cycling uphill. Another such change would be a networked steering control system similar to experimental automated highway control systems that allow cars to travel bumper-to-bumper at high speeds. Such a system would execute tactical moves much more quickly and precisely than people can execute them. The combination of regenerative breaking, boosting motors, and automated steering would quickly lead to the development of a means of transferring power from one bicycle to another. This change would eliminate the need to rotate team members from tiring positions to less tiring positions. It would also allow the team to reduce wind resistance by putting cyclists who ride taller than others near the center of the pack. In the long run, an accomplished team taking this approach would resemble a liquid that undergoes phase changes as it becomes ever more fluid.

"Liquids that undergo phase changes as they become ever more fluid lie outside of our everyday experience. A dramatic example of such a liquid is that of the isotope of helium that has two neutrons and two electrons (^{4}He). ^{4}He atoms are bosons (objects that have integer spin). Unlike fermions (objects that have non-integer spin), more than one boson can occupy

the same quantum state. Statistically, this is unlikely to happen unless bosons enter their ground state (lowest energy state). As we remove more energy from these bosons, more of them enter their ground state. At just below 2.2 degrees Kelvin and one atmosphere of pressure, a large enough percentage of them enter their ground state for ^{4}He liquid to change from being only slightly more fluid than classical physics predicts (Helium I) to being much more fluid than classical physics predicts (Helium II). In short, it changes from being a fluid to a superfluid.

"Superfluid ^{4}He atoms interact with each other too much for all of them to enter their ground state. However, other types of bosons do not have this problem. For example, at roughly 170 billionths of a degree above absolute zero, the bosonic form of rubidium enters a state of matter in which all atoms are in their ground state. In this state, which physicists call a Bose Einstein condensate, groups of these atoms act as if they were a single atom."

were deleted.

Chapter 3, *Public Entropy*, entire section

"***Public Entropy***
One lesson that we can learn from contemplating how liquids become superfluid is the usefulness of the concept of entropy. Entropy is a measure of the amount of disorder in an object. We may use this concept to think about useful resources in decision processes. In this context, entropy is a measure of the amount of *non-knowledge* wealth that it is theoretically possible to remove from a decision process without lowering the quality of the process. We may call this measure *public entropy*.[6]"

"*Zero public entropy* is the transcendental end of the process of lowering public entropy.[7] From the view of modern economics, it is the dynamic alternative to Pareto optimality.[8] From the view of a person behind the veil of complete ignorance, it is what makes the ideal process of deciding well ideal.

"We can use the concept of zero public entropy to help us find problems to solve. As we saw in the EOQ example, the concepts we use to frame our problems tend to blind us to finding better problems to solve. In the cycling example above, our concept of 'cycling race' tends to blind us to ways of replacing knowledge wealth for non-knowledge wealth. These include regenerative breaking, boosting motors, and automated steering. A strategy based on lowering public entropy would reveal this problem.

"A more subtle blinder is the false belief that we can separate one decision process from all others. For a team of cyclists to take a truly public approach to overcoming constraints, its solution to cycling well must be part of the solution to deciding well. Hence, being part of the team must be something that every team member needs to pursue Wisdom. In general, lowering public entropy reveals not only problems with solutions that fall within the bounds of chosen problems, but also those that surpass these bounds. We may call the former *normal problems* and the latter *revolutionary problems*."

"[6] From the view of modern science, 'entropy' has several meanings. In physics, it is a measure of disorder; in thermodynamics, it is a measure of inefficiency; and in information theory, it is a measure of unpredictability. From the boundlessly pragmatic view of this work, 'entropy' means waste in solving the problem that contains all other problems. Physical entropy is the negation of physical order useful in solving this problem; thermodynamic entropy is the negation of thermodynamic efficiency in solving this problem; and informational entropy is the negation of informational efficiency in solving this problem."

"[7] Removing non-knowledge wealth from the process of deciding well without lowering the quality of deciding well induces the creation of knowledge of how to decide well using fewer non-knowledge resources. For more on the process of inducing the creation of knowledge useful in deciding well, see the Appendix."

"[8] Pareto optimality is the state of the world in which it is impossible to make any person better off without making at least one other person worse off."

was changed to:

"***Public Entropy***
Modern scientists use the term 'entropy' to describe measures of inefficiency (in heat engines), disorder (in physical systems), and uncertainty (in information processing). We may also use it to describe waste in deciding well. In this context, entropy is a measure of the amount of *non-knowledge* wealth that it is theoretically possible to remove from a decision process without degrading the process. We may call this measure *public entropy* and the transcendental end of lowering this measure *zero public entropy*. From the view of modern economics, zero public entropy is the dynamic analogue of and alternative to Pareto optimality.[6] From the view of a person behind the veil of complete ignorance, it is all people deciding perfectly.

"At zero public entropy, all people decide perfectly. There are a nearly infinite number of ways for people to decide foolishly, but only one way for people to decide perfectly. Individual people tend to become more predictable the better they decide. Further, they tend to work together more coherently the better they decide. Consider how a squad of raw recruits would act if forced by circumstances into combat against a superior force. We cannot predict exactly how these people will act, but we can predict that they will not act as a unit, as a single entity. Now consider how a squad of seasoned special forces soldiers would act under the same circumstances. To prevail over a superior force, they need to act unpredictably. Although we cannot predict exactly how these people will act, we can predict that they will act as if they were a single entity.[7]

"We can use the concept of public entropy to help us find problems to solve. As we saw in the EOQ example, the concepts that we use to frame our problems tend to blind us to finding better problems to solve in pursuing timeless ends. We can overcome this blindness by removing ever more non-knowledge resources. As we do so, we learn to replace ever more non-knowledge resources with knowledge resources.[8] Most of the problems we discover by removing non-knowledge resources from a decision process have solutions that fall within

the bounds of our chosen problem, some have solutions that surpass the bounds of our chosen problem. We may call the former *normal problems* and the latter *revolutionary problems.*"

"[6] Pareto optimality is the state of the world in which it is impossible to make any person better off without making at least one other person worse off."

"[7] Modern economists such as Paul Samuelson were right to look to thermodynamics for models of how large groups of people will act, but were wrong to look to classical thermodynamics. To explain what happens in economies, which includes what happens as we learn to live ever more wisely, we need to explain based not on what happens at the margins, but rather on what happens as we create knowledge, which calls for us to consider what happens in the infinitely long run. Studying what happens to people in the infinitely long run is the equivalent of studying what happens in physics at near absolute zero temperature. A group of people working together perfectly is the public analogue of a *Bose-Einstein condensate*. As we learn to decide ever more wisely, we learn to work together ever more wisely. The process of learning to work together ever more wisely is not continuous. A bit more knowledge may have no effect or a very large effect. Imagine a battalion of raw recruits. Now imagine that we begin to replace raw recruits with seasoned special forces one person at a time. Each replacement may have no effect, some effect, or a large effect on the ability of soldiers in the battalion to act as a unit. Physical analogues of large effects include transitions to superconductivity and superfluidity."

"[8] For more about the process of inducing the creation of knowledge useful in deciding well, see the Appendix."

Chapter 3, *Decision-Oriented Interpretations of Quantum Mechanics*, first paragraph

"Another lesson that we can learn from contemplating how liquids become superfluid is the usefulness of studying extreme cases. By thinking about what happens as we approach absolute zero, we may refine our beliefs about how quantum mechanics relates to pursuing Wisdom."

was merged into the second paragraph and changed to:

"We may also use the concept of public entropy to relate quantum mechanics to pursuing Wisdom."

Chapter 3, *Decision-Oriented Interpretations of Quantum Mechanics*, last paragraph, end

Added the sentences:

"In this class, we relate the strange behaviors of objects on the quantum-level not simply to everything else we believe we know about physics, but rather everything we believe we know about the world. As we shall see in the next chapter, this rings true with Einstein's call for physicists to think critically about not only physics, but also everyday thinking."

Chapter 3, *A Decision-Tree Interpretation of Quantum Mechanics*, first paragraph, third sentence

"One member of this new class is a model in which we assume that there are no constraints on gathering and using information. Information flows as freely as it does in the modern economic model of perfect competition. The major difference is that this information includes information not only about how best to satisfy our wants, but also about how best to satisfy our needs. In this ideal model, people decide perfectly with respect to all currently available knowledge. In doing so, all people act as if they were a single decider facing a single problem, which is the problem that contains all other problems. We may think of this model as a single decision-tree[10] in which events are either under the control of people pursuing Wisdom or not under the control of people pursuing Wisdom.[11]"

"[10] We may model deciding well as a tree consisting of decision events and uncertain events. Decision events are events that change the course of events that the decider controls. Uncertain events are events that change the course of events that the decider does not control."

"[11] Implicit in this decision-oriented model of the world is belief that free will exists. We currently have no empirical way of disproving that free will either exists or does not exist. From the multiplex view, we ought to choose the research program that seeks to disprove the beautiful choice, which is that free will exists. This program calls for us to act as if free will exists."

were changed to:

"We can imagine an ideal decision-oriented model in which information flows as freely as it does in the modern economic model of perfect competition. In this ideal model, people decide perfectly with respect to all currently available knowledge. In doing so, they act as if they were a single decider facing a single problem, which is the problem that contains all other problems. We may think of this model as a single decision-tree.[10]"

"[10] Decision tree models consist of decision events, events that change the course of events that the decider controls, and uncertain events, events that change the course of events that the decider does not control. Here, we are the decider. Implicit in this model is the belief that we ought to act as if free will exists. This belief rests on the belief that we ought to test all of our beliefs. If we choose to believe that free will exists, we ought to seek to disprove that free will exists, which calls for us to act as if free will exists. On the other hand, if we choose to believe that free will does not exist, we ought to seek to disprove that free will does not exist, which calls for us to act as if free will does not exist. Arguably, the former is the more beautiful problem to solve."

Chapter 4, Refining Everyday Thinking, first paragraph, footnote, first two sentences

"This is compatible with the instrumental interpretation of Milton Friedman's definition of positive economic science as "a body of tentatively accepted generalizations about economic

phenomena that can be used to predict the consequences of changes in circumstances (Friedman, Milton, "The Methodology of Positive Economics," *Essays in Positive Economics*, Chicago: University of Chicago Press, 1953, p. 39)". However, communication across frames is only partial."

were changed to:

"Milton Friedman defined positive economic science as "a body of tentatively accepted generalizations about economic phenomena that can be used to predict the consequences of changes in circumstances (Friedman, Milton, "The Methodology of Positive Economics," *Essays in Positive Economics*, Chicago: University of Chicago Press, 1953, p. 39)". Communication across frames is only partial."

Chapter 4, *A Crude Look at the Whole*, first paragraph

Changed "However, deciding" to "Deciding" in the seventh sentence.

Chapter 4, Useful Reminders, first paragraph

"We pursue the Truth by pursuing Wisdom. Pursuing Wisdom calls for us to judge not only footholds and handholds but also paths leading to Wisdom, hence to all of the boundless factors of pursuing Wisdom."

was changed to:

"Pursuing the Truth calls for us to pursue Wisdom, which in turn calls for us to pursue all of the boundless factors of pursuing Wisdom."

Chapter 6, *Schweitzer's Universal Spiritual Need*, third paragraph

Changed "been a great hindrance to" to "greatly hindered" in last sentence.

Chapter 6, *Schweitzer's Universal Spiritual Need*, fourth paragraph

Changed ". However," to ", but" in the first and second sentences.

Chapter 6, *Worldly Benefits of Magical Mysticism*, first paragraph

Changed ". However," to ", but" in the first and second sentences.

Chapter 6, Experiencing the Mysterious, second paragraph

Changed "these two ends often complement each other. However, they also" to "the pursuits of these two ends both support each other and" in the last two sentences.

Chapter 6, A Common Timeless End, first paragraph

Changed "Wholeness" to "Pursuing Wholeness" and "the Good" to "pursuing the Good" in the second sentence.

Changed "The Good" to "Pursuing the Good" and "Wholeness" to "pursuing Wholeness" in the fourth sentence.

Appendix, Less is More, first paragraph

Changed "wisely (efficiently and effectively)" to "well" in the first sentence.

Changes in Version 2011.10.05

Chapter 3, Pursuing the Ring of Truth, last paragraph, end

Added the sentence:

"Beautiful things not only please us, but also enlighten us."

Chapter 8, Natural Reasoning, first paragraph, fourth sentence

"Only when they lack the means to cooperate well do they compete."

was deleted.

Changes in Version 2011.10.08

Chapter 1, Useful Frames, third paragraph, footnote, first two sentences

"Note that what we deem to be a matter of efficiency changes with the size of the problem. Thus, speaking of efficiency without specifying a problem scale can cause great confusion."

was changed to:

"Because what we deem to be a matter of efficiency changes with the size of the problem, speaking of efficiency without specifying a problem scale can cause great confusion."

Chapter 1, Values, fifth paragraph

Changed "Hence, the Europeans" to "The Europeans" in the tenth sentence.

Chapter 1, *Steps for Building Multiple-Frame Models*, fourth paragraph, third sentence

"Hence, the pursuits of Wisdom and the Truth intertwine to form a single pursuit."

was deleted.

Chapter 1, *Invariant Values*, first paragraph, footnote

Changed "Note that we" to "We" in the first sentence.

Chapter 2, Production, first paragraph

Changed "Thus, production" to "Production" in the second and last sentences.

Chapter 3, Contemplating the Way Forward, last paragraph

"The recursive process for knowing transcendent objects is endless. Hence, we may reasonably call the result of a cycle its *timeless end* and the result of the process its *transcendent end*."

was changed to:

"Because the recursive process for knowing transcendent objects is endless, we may reasonably call the result of a cycle its *timeless end* and the result of the process its *transcendent end*."

Chapter 3, *Decision-Oriented Interpretations of Quantum Mechanics*, first paragraph, second and third sentences

"Quantum mechanics provides us with statistical rather than exact predictions about what will happen on the microscopic level. This shortcoming is due to two strange behaviors of objects on this level."

were changed to:

"Objects on the microscopic level of quantum mechanics do not behave like objects on the macroscopic level. Two behaviors of objects on this level are especially strange."

Chapter 3, *Decision-Oriented Interpretations of Quantum Mechanics*, second paragraph

Changed "somewhere" to "somewhere in the universe" in the second to last sentence.

Chapter 3, *Decision-Oriented Interpretations of Quantum Mechanics*, last paragraph

Changed "not simply to everything else we believe we know about physics, but rather" to "to" in the third sentence.

Chapter 5, Tax Well, first paragraph

"Taxing, like restricting speech or actions, affects how we create and use knowledge. The economic turbulence and embedded mistakes from taxing foolishly are just as real, and just as dangerous, as those from restricting speech or actions foolishly. Thus, policymakers ought to think as carefully about how they tax as they do about how they restrict speech or actions."

was changed to:

"Tax policies affect how we create and use knowledge. The mistakes from foolish tax policies are just as real, and just as dangerous, as other foolish policies. Policymakers ought to think as long and hard about how they tax as they do about how they restrict speech or action."

Chapter 7, The Scope of Game Theory, second paragraph

Changed "Hence" to "From Hofstadter's view" in the last sentence.

Chapter 8, Complete Reasoning, last paragraph

"Multiple-frame models of pursuing Wisdom provide us with structures for thinking about not only conflicts but also holes in our networks of beliefs. Hence, we may call them *reasonably complete*."

was merged into the preceding paragraph and changed to:

"Because multiple-frame models of pursuing Wisdom provide us with structures for thinking about not only conflicts but also holes in our networks of beliefs, we may call them *reasonably complete*."

Appendix, Folding in Processes, second paragraph

Changed "Thus, the" to "The" in the second sentence.

Changes in Version 2011.10.11

Entire work

Checked all referenced external links and updated time references to these links.

Chapter 1, *The EOQ/RTS Example*, last paragraph, footnote

Changed "For more on" to "For more about" in the last sentence.

Chapter 1, *Ever More Complete Multiple-Frame Models*, first paragraph, footnote

Changed "For more on" to "For more about" in the last sentence.

Chapter 1, *Ever More Complete Multiple-Frame Models*, last paragraph, footnote

Changed "on logical completeness, see the last two chapters" to "about logical completeness, see the third, seventh, and eighth chapters" in the first sentence.

Chapter 3, Contemplating the Way Forward, first paragraph

"Pursuing Wisdom calls for us to think deeply about how we decide well. We can use the concept of *transcendental recursive objects* to help us organize our thoughts."

was changed to:

"Pursuing Wisdom calls for us to think beautifully about how we decide well. We can use the concept of *transcendental recursive objects* to help us think beautifully about thinking beautifully."

Chapter 3, *Three Approaches to Policy*, entire section

"***Three Approaches to Policy***
From the view of mathematics, π is *computable*, which is to say that we can program an abstract computing machine that does nothing more than follow programmed rules to compute π. In contrast, from the view of the multiple-frame approach to pursuing Wisdom, π is not computable. The claim that π is computable arises from reducing the actual problem of computing π to an abstract problem of computing π that ignores constraints. The following thought experiment explains how three distinct approaches to overcoming constraints give rise to three distinct approaches to policy.

"Imagine giving the greatest minds of 1776 the task of computing the value of π to a trillion (10^{12}) decimal places.[3] Most of these people would likely provide what they believed to be the best means of computing π. Because this approach relies on currently existing means of overcoming constraints, we may call this *the temporal approach to overcoming constraints*. From this view, we ought to promote solutions that use existing tools. We may call this the *engineering approach to policy*. People who take this approach put their faith in the wisdom of current experts.[4]

"Now imagine giving the greatest minds of today the task of computing π to a googol (10^{100}) decimal places. Some of these people would likely provide what they believe to be the best means of computing π. Others would likely say that people seeking to live well will invent ever better means of computing and that we cannot imagine what better means they will invent. Because this approach relies on the timeless process of living well, we may call this *the timeless approach to overcoming constraints*. From this view, we ought to promote the timeless end of living well and leave the problem of overcoming constraints to people to work out among themselves. We may call this the *biological approach to policy*.[5] People who

take this approach put their faith in the wisdom of current concepts, customs, case law, and common sense.

"From the multiplex view, there is a third approach to overcoming constraints. People taking this approach would say that the best means of computing π to a googol decimal places is to pursue Wisdom. We may call this *the invariant approach to overcoming constraints*. From this view, we ought to promote deciding well using the multiple-frame approach to pursuing Wisdom and leave the problem of overcoming constraints to people to work out among themselves. We may call this the *public approach to policy*. People who take this approach put their faith in the pursuit of wisdom that transcends current knowledge."

"[3] In December 20002, computer scientists Kanada, Ushio, and Kuroda computed pi to over 1.24 trillion decimal places. See the Wolfram MathWorld entry on π digits, <http://mathworld.wolfram.com/PiDigits.html> (31 March 2011)."

"[4] In his book, *A Conflict of Visions: Ideological Origins of Political Struggles* (New York: William Morrow,1987), Thomas Sowell distinguishes between what he calls unconstrained and constrained visions. From an unconstrained view, the problems we face are relatively simple relative to our ability to solve them. The problems we face are obvious. All we need to do to solve our problems is to put the right people in charge. This is consistent with an engineering approach to policy. From a constrained view, the problems we face are complex relative to our ability to solve them. The process of finding problems to solve is not trivial. Further, the people best able to find problems and solve are often the people closest to them. This is inconsistent with an engineering approach to policy."

"[5] Note the modern link between the timeless approach to overcoming constraints and the biological approach to policy. Implicit in this relation is the belief that the natural timeless end is the timeless end of living well. From the multiplex view, the natural timeless end is the timeless end of deciding well, which all living beings naturally pursue, some much more successfully than others. Purveyors of modern thought have replaced ancient stories of pursuing the timeless end of deciding well (e.g., following the *Tao* or *Logos*) with the modern story of survival of the fittest. They have replaced the holistic idea of competing well in order to cooperate well with the reductionist idea of cooperating well in order to compete well. For more on this, see the last two chapters."

was changed to:

"***Overcoming Constraints in Pursuing Wisdom***
The process of computing the value of π as mathematicians define this process differs from the process of pursuing Wisdom in a profound way. The process of refining the process of computing the value of π is not part of the process of computing the value of π. In contrast, the process refining the process of pursuing Wisdom is part of the process of pursuing Wisdom.[3] Nevertheless, we can draw some conclusions about overcoming constraints in pursuing Wisdom from the much simpler case of overcoming constraints in computing the value of π.

"From the view of mathematics, π is *computable*, which is to say that we can program an abstract computing machine that does nothing more than follow programmed rules to compute π. In contrast, from the multiplex view, π is computable in theory, but not computable in practice. In theory, the claim that π is computable arises from reducing the actual problem of computing π to an abstract problem of computing π that ignores constraints. In practice, we need to consider constraints on computing π. Ignoring these constraints tends to blind us to the practical problems involved in choosing the best means of computing π.

"Imagine giving the greatest minds of 1776 the task of computing the value of π to a trillion (10^{12}) decimal places.[4] Most of these people would likely provide what they believed to be the best means of computing π. Because this approach relies on currently existing means of overcoming constraints, we may call this *the temporal approach to overcoming constraints*.[5]

"Now imagine giving the greatest minds of today the task of computing π to a googol (10^{100}) decimal places. Most of these people would likely say that people seeking to live well will invent ever better means of computing and that we cannot imagine what better means they will invent. Because this approach relies on the timeless process of living well, we may call this *the timeless approach to overcoming constraints*.

"From the multiplex view, there is a third approach to overcoming constraints. Because people who pursue Wisdom invent ever better means of calculating well more readily than people who do not pursue Wisdom, the best means of computing π to a googol decimal places is to pursue Wisdom. We may call this *the invariant approach to overcoming constraints*.

"***Three Approaches to Policy***
Each of these approaches to overcoming constraints gives rise to a distinct approach to policy. From view of the temporal approach to overcoming constraints, we ought to promote solutions that use existing tools. We may call this the *engineering approach to policy*. People who take this approach put their faith in the wisdom of current experts.

"From the view of the timeless approach to overcoming constraints, we ought to promote the timeless end of living well and leave the problem of overcoming constraints to people to work out among themselves. We may call this the *biological approach to policy*. People who take this approach put their faith in the wisdom of current concepts, customs, case law, and common sense.

"From the view of the invariant approach to overcoming constraints, we ought to promote deciding well using the multiple-frame approach to pursuing Wisdom and leave the problem of overcoming constraints to people to work out among themselves. We may call this the *public approach to policy*. People who take this approach put their faith in the public pursuit of wisdom that transcends current knowledge.[6]"

"[3] We may call a process of reasoning that contains a complete means of refining itself *reasonably complete*. So conceived, the reason of pursuing Wisdom is reasonably complete."

"[4] In December 20002, computer scientists Kanada, Ushio, and Kuroda computed pi to over 1.24 trillion decimal places. See the Wolfram MathWorld entry on π digits, <http://mathworld.wolfram.com/PiDigits.html> (11 October 2011)."

"[5] In his book, *A Conflict of Visions: Ideological Origins of Political Struggles* (New York: William Morrow,1987), Thomas Sowell distinguishes between what he calls unconstrained and constrained visions. From an unconstrained view, finding the best problems to solve tends to be trivial. Hence, deciding well is largely a matter of giving the people who are willing to address the problem the power to address it. This is consistent with the temporal approach to overcoming constraints. From a constrained view, finding the best problem to solve tends to be difficult. Further, the people best able to find problems and solve problems tend to be the people closest to them. This is not consistent with the temporal approach to overcoming constraints."

"[6] From the multiplex view, the natural timeless end is the timeless end of deciding well, which all living beings naturally pursue, some much more successfully than others. Modern thinkers have replaced ancient stories of pursuing the timeless end of deciding well, e.g., following the *Tao* or *Logos*, with the modern story of survival of the fittest. In doing so, they have replaced the holistic idea of competing well in order to cooperate well with the reductionist idea of cooperating well in order to compete well. For more about natural reasoning, see the last two chapters."

Chapter 3, *Public Entropy*, first paragraph

Changed "From the view of modern economics, zero" to "Zero" in the fourth sentence.

Chapter 3, *Public Entropy*, second paragraph

Changed "We cannot predict exactly how these people will act, but we" to "Although we cannot predict exactly how these people will act, we" in the fourth sentence.

Changed "prevail over" to "defeat" in the seventh sentence.

Changed "as if they were a single entity" to "as a unit, as a single entity" in the last sentence.

Chapter 3, *Public Entropy*, last paragraph, last two sentences

"Most of the problems we discover by removing non-knowledge resources from a decision process have solutions that fall within the bounds of the timeless problem we believe we are addressing, but some have solutions that fall outside the bounds of the problem we believe we are addressing. We may call the former *normal problems* and the latter *revolutionary problems*."

were changed to:

"Most of the problems we discover by removing non-knowledge resources from a decision process have solutions that fall within the bounds of the timeless problem we believe we are addressing. We may call these *normal problems*. Some have solutions that fall outside the bounds of the problem we believe we are addressing. We may call these *revolutionary problems*. As we shall see, the most common revolutionary problem of modern times is the problem of reason."

Chapter 3, *A Decision-Tree Interpretation of Quantum Mechanics*, first paragraph, footnote

Changed "Arguably, the" to "The" in the last sentence.

Chapter 5, *Promote Pursuing Wisdom, not Temporal Order*, first paragraph, footnote

Changed "solve" to "address" in the last sentence.

Chapter 6, The Farther Reaches of our Nature, second paragraph

Changed "proposition" to "claim" in all (4 occurrences).

Chapter 7, *Boyd's Grand Strategy*, last paragraph, footnote

Changed "For more on" to "For more about" in the last sentence.

Chapter 8, Complete Reasoning, last paragraph

"Because multiple-frame models of pursuing Wisdom provide us with structures for thinking about not only conflicts but also holes in our networks of beliefs, we may call them *reasonably complete*."

was returned to a separate paragraph and changed to:

"We may call a process of reasoning that contains a complete means of refining itself *reasonably complete*. So conceived, the reason of pursuing Wisdom is reasonably complete. It helps us think about not only conflicts but also holes in our networks of beliefs."

Changes in Version 2011.10.12

Chapter 1, Choosing Frames Well, second paragraph

Changed "clarity of mind" to "knowledge resources" in the fourth sentence.

Chapter 8, Useful Reasoning, last paragraph

Changed "Thus" to "Therefore" in the third sentence.

Chapter 8, Complete Reasoning, last paragraph

"Because multiple-frame models of pursuing Wisdom provide us with structures for thinking about not only conflicts but also holes in our networks of beliefs, we may call them *reasonably complete*."

was changed back to a separate paragraph and changed to:

"We may call a process of reasoning that contains a complete means of refining itself *reasonably complete*. So conceived, the reason of pursuing Wisdom is reasonably complete. It helps us think about not only conflicts but also holes in our networks of beliefs."

Changes in Version 2011.10.15

Entire work

Checked all referenced external links and updated time references to these links (14 October 2011).

Preface, last paragraph, third and fourth sentences

"Those trained to classify reason will find it especially challenging. They have more to unlearn."

were deleted.

Chapter 1, *Ever More Complete Multiple-Frame Models*, first paragraph, footnote

"[13] The pursuit of living well concerns our internal (teleonomic) programming. Given the critical importance of our need for spiritual wholeness and the difficulty of testing our beliefs about this need, we ought to consider this need separately. Among other things, this will allow us to reconcile materialist and dualist means of satisfying this need."

was deleted.

Chapter 1, *Ever More Complete Multiple-Frame Models*, fifth paragraph

"Consider how we can use this rule for living and working together well to help us choose the best frame for judging how well we govern ourselves. From within each frame we consider, the frame we are in looks to be the best frame. We find ourselves in a mental hall of mirrors from which analytical techniques cannot help us escape. Twentieth-century philosopher John Rawls provides us with a technique that can help us reason our way out of

this quandary. He asks us to imagine what we should choose if we were ignorant of the circumstances of our birth.[14] For this imagined original position of ignorance to produce a *completely just* end, we must consider what end we should want people to pursue if we were *completely ignorant* of the circumstances of our birth, which includes ignorance of that species we will be and into what era we will be born. From behind this veil of complete ignorance, we should want all people to pursue the timeless end of revering life well, which we may call *Wholeness*."

"[14] Rawls, John, *A Theory of Justice* (Cambridge, MA: The Belknap Press of Harvard University, 1971), chapter III."

was deleted.

Chapter 1, *Invariant Values*, first paragraph, last two sentences

"To choose other than these invariant values is to choose to aim at something less than Wisdom. To choose other than these values is to choose to decide foolishly."

was changed to:

"To choose other than these invariant values is to choose to decide foolishly."

Chapter 2, *Pleasure and Pain*, second paragraph, footnote, last sentence

"We see this reflected in the once popular surfer concept of "total involvement" and in psychologist Mihály Csíkszentmihályi's concept of "flow.""

was deleted.

Chapter 2, Profit, first paragraph

Changed "money" to "taxes" in the last sentence.

Chapter 3, *Public Entropy*, first paragraph, last sentence

"From the view of a person behind the veil of complete ignorance, it is all people deciding perfectly."

was deleted.

Chapter 3, *Public Entropy*, last paragraph, last sentence

"As we shall see, the most common revolutionary problem of modern times is the problem of reason."

was deleted.

Chapter 4, *Academic Fields*, second paragraph

Changed "on the boundless factors" to "on what people need, which is knowledge useful in pursuing the boundless factors" in the fourth sentence.

Chapter 4, Refining Deciding Well, first paragraph

Changed "logical" to "*logical*" in the second sentence.

Chapter 4, Refining Deciding Well, second paragraph

Changed "beautiful" to "*beautiful*" in the first sentence.

Chapter 5, *A Sovereign Story of Pursuing Wisdom*, last paragraph, first footnote

Changed "timeless" to "classical" in the second sentence.

Chapter 5, Liberalism, second paragraph, fourth sentence

"As the veil of complete ignorance technique reveals, social justice is not Justice."

was deleted.

Chapter 5, Liberalism, third paragraph

Changed "us" to "us in pursuing happiness (the Good)" in the last sentence.

Chapter 6, The Farther Reaches of Our Nature, fourth paragraph

Changed "statement" to "claim" in the third sentence.

Chapter 6, The Farther Reaches of Our Nature, last paragraph

Changed "the study of" to "studying" in the second sentence.

Chapter 6, *Schweitzer's Universal Spiritual Need*, first paragraph, second sentence

"The satisfaction of this need allows us to transcend our normal consciousness and experience awe, rapture, and bliss."

was changed to:

"Satisfying this need allows us to experience awe, rapture, and bliss."

Chapter 6, *Schweitzer's Universal Spiritual Need*, end

Added the paragraph:

"Twentieth-century philosopher John Rawls provides us with a technique that can help us refine our beliefs about revering life well. He asks us to imagine what we should choose if we were ignorant of the circumstances of our birth.[7] For this imagined original position of ignorance to produce a *completely just* end, we must consider what end we should want people to pursue if we were *completely ignorant* of the circumstances of our birth, which includes ignorance of that species we will be and into what era we will be born. From behind this veil of complete ignorance, we should want all people to pursue the timeless end of revering life well, which we may call *Wholeness*. From behind this veil, *zero public entropy* is all people deciding perfectly."

"[7] Rawls, John, *A Theory of Justice* (Cambridge, MA: The Belknap Press of Harvard University, 1971), chapter III."

Chapter 6, *Worldly Benefits of Detachment*, last paragraph

Changed "classic" to "mythic" in the second sentence.

Chapter 7, *Temporal OODA Loop Analysis*, last paragraph, beginning

Added the sentence:

"Boyd first used his OODA loop model to address a temporal problem."

Chapter 7, *Timeless OODA Loop Analysis*, last paragraph, first sentence

"Boyd also used his OODA loop model to address problems in which learning was important."

was changed to:

"Boyd next used his OODA loop model to address timeless problems."

Chapter 8, Complete Reasoning, last paragraph

Changed "the reason of pursuing Wisdom" to "the reason of deciding well using the multiple-frame approach to pursuing Wisdom" in the second sentence.

Changed "networks of beliefs" to "belief systems" in the last sentence.

Changes in Version 2011.10.18

Chapter 6, *Schweitzer's Universal Spiritual Need*, last paragraph

Deleted ", which we may call *Wholeness*" from the fourth sentence.

Chapter 6, Worldly Benefits of Detachment, third paragraph, first sentence

"Further, denying the world and life as we currently know it can change our belief systems for the better."

was changed to:

"Detaching ourselves from the world and life can also change our belief systems for the better."

Chapter 6, A Common Timeless End, first paragraph

Inserted the following paragraph and sentence at the beginning of the paragraph:

"Defining the process of living well and the timeless end of living well creates ambiguity in the frame for pursuing the Good. We may refine our beliefs about pursuing the Good by creating a frame for satisfying our need for mystical oneness. We do this by defining the process of satisfying our need for mystical oneness and the timeless end of this process in terms of one another. Adding this frame allows us to think more clearly about the relation between pursuing the Good and pursuing Wisdom.

"We may call the timeless end of satisfying our need for mystical oneness *Wholeness*."

Italicized the last sentence:

"*Pursuing Wisdom makes it ever less likely that we will need to make this choice.*"

Changes in Version 2011.10.20

Acknowledgments, last paragraph

Changed "had been" to "was" in the first sentence.

Chapter 1, Choosing Frames Well, last paragraph, end

Added the footnote:

"[5] From the boundlessly pragmatic view put forth in this work, this simple prescription lies at the heart of reason. At issue is the usefulness of a form of reason based not only on logic, but also on beauty within the context of pursuing the timeless end of deciding well. Consider Georg Cantor's continuum hypothesis. Using his theory of sets, Cantor discovered that some infinities were larger than others. For example, the number of members of the set of real

numbers is larger than that of integers. Cantor went on to hypothesize that there were no levels of infinity between those of integers and real numbers. Cantor drove himself insane trying to decide whether this hypothesis was true or false. Later, Kurt Gödel drove himself insane trying to decide whether it was true, false, or undecidable. From the view of this work, a more basic question than either of these is whether the approach to mathematics in which this hypothesis is true is more useful than the approach in which this hypothesis is false in pursuing the timeless end of deciding well. An even more basic question is whether either approach has a place in pursuing the timeless end of deciding well."

Changes in Version 2011.10.22

Preface, tenth paragraph

Changed "Revering Life" to "Linking" in the first sentence.

Chapter 1, *Invariant Values*, first paragraph

Changed "The boundless factors of deciding well" to "These factors" in the third sentence.

Changed "invariant values" to "values" in the fourth sentence.

Chapter 1, *Invariant Values*, first paragraph

Changed "The boundless factors of deciding well" to "These factors" in the third sentence.

Chapter 2, A Strategy for Learning Well, first paragraph

Changed "using" back to "deciding well using" in the last sentence.

Chapter 3, *Overcoming Constraints in Pursuing Wisdom*, third paragraph

Changed "a trillion (10^{12})" to "10^{12} (a trillion)" in the first sentence.

Chapter 3, *Overcoming Constraints in Pursuing Wisdom*, fourth paragraph

Changed "a googol (10^{100})" to "10^{24} (a trillion squared)" in the first sentence.

Chapter 3, *Overcoming Constraints in Pursuing Wisdom*, last paragraph

Changed "a googol" to "10^{24}" in the second sentence.

Chapter 4, *A Crude Look at the Whole*, first paragraph, last footnote

Changed ""roughness" of economic flows relative to the speed of progress" to "viscosity of economic flows" in second sentence.

Chapter 6, title

Changed "Revering Life Well" to "Linking Well."

Chapter 6, The Farther Reaches of Our Nature, last paragraph

Changed "rightly" back to "wisely" in the last sentence.

Chapter 6, *Schweitzer's Universal Spiritual Need*, last paragraph

Removed italics from "zero public entropy" in the last sentence.

Chapter 7, *Boyd's Grand Strategy*, last paragraph, footnote

Changed "sophistry" to "modern sophistry" in the last sentence.

Changes in Version 2011.10.25

Chapter 1, Choosing Frames Well, last paragraph, footnote

Changed "decide" to "prove" in the seventh and eighth sentences (2 occurrences).

Chapter 1, Choosing Frames Well, last paragraph, footnote, last two sentences

"From the view of this work, a more basic question than either of these is whether the approach to mathematics in which this hypothesis is true is more useful than the approach in which this hypothesis is false in pursuing the timeless end of deciding well. An even more basic question is whether either approach has a place in pursuing the timeless end of deciding well."

were changed to:

"From the view of this work, the relevant questions are (1) whether the approach to mathematics in which the continuum hypothesis is true has a place in pursuing the timeless end of deciding well and (2) whether the approach to mathematics in which the continuum hypothesis is false has a place in pursuing this timeless end."

Chapter 6, A Common Timeless End, last paragraph, end

Added the paragraph:

"From the modern view, the belief that pursuing Wholeness is subordinate to pursuing the Good conflicts with the belief that pursuing the Good is subordinate to pursuing Wholeness. From the multiplex view, the reason these two beliefs conflict is that we do not know which is the better belief. There is a hole in our belief systems that acting calls for us to fill with faith. We best settle such conflicts by competing to see which belief best helps us pursue Wisdom."

Changes in Version 2011.10.29

Preface, fifth paragraph

Changed "have tried to provide" to "provide" in the first sentence.

Chapter 3, *Public Order*, last paragraph, footnote

"[6] From the multiplex view, the natural timeless end is the timeless end of deciding well, which all living beings naturally pursue, some much more successfully than others. Modern thinkers have replaced ancient stories of pursuing the timeless end of deciding well, e.g., following the *Tao* or *Logos*, with the modern story of survival of the fittest. In doing so, they have replaced the holistic idea of competing well in order to cooperate well with the reductionist idea of cooperating well in order to compete well. For more about natural reasoning, see the last two chapters."

was deleted.

Chapter 3, *A Decision-Tree Interpretation of Quantum Mechanics*, first paragraph, footnote, last sentence

"In taking this approach to pursuing Wisdom, we may hope to see as deeply as Georg Cantor, Ludwig Boltzmann, Kurt Gödel, and Alan Turing without suffering their fates. For more on these four men, their works, and their fates, see David Malone's documentary film, *Dangerous Knowledge* <http://www.youtube.com/watch?v=x0hALyh40xg> (14 October 2011)."

was deleted.

Chapter 3, The Elephant in the Room, second and third paragraphs

"The essential biological explanation of this coincidence is simple and straightforward. We evolved to have a religious need to become a part of something infinitely greater than ourselves. Seeking to satisfy this need is useful in securing the best chances of survival for our offspring and ourselves. We seek to satisfy this need by deciding well. We collectively refine our means of deciding well by deciding well over time. Deciding well and our understanding of deciding well co-evolve.

"The essential theological explanation of this coincidence is as simple and straightforward. The Creator created what we call the laws of nature. These include the need for life to survive and thrive. Life flourishes by deciding well. As people, we collectively refine our means of deciding well by deciding well over time. Deciding well and our understanding of deciding well co-evolve."

were changed to:

"The essential atheistic explanation of this coincidence is simple and straightforward. We evolved to have a religious need to become a part of something infinitely greater than ourselves. We satisfy this need by deciding well. We collectively refine our means of deciding well by deciding well over time. Deciding well using the multiple-frame approach to pursuing Wisdom is a strategy for learning to know everything about the world.

"The essential theistic explanation of this coincidence is as simple and straightforward. The Creator created what we call the laws of nature. These laws include the need for life to flourish. Life flourishes by deciding well. As people, we collectively refine our means of deciding well by deciding well over time. Deciding well using the multiple-frame approach to pursuing Wisdom is a strategy for learning to know everything about the world, a research program for understanding the Creator's thoughts in creating the world."

Chapter 3, The Elephant in the Room, last paragraph

Changed "explanations of this coincidence" to "explanations" in the first sentence.

Chapter 6, A Common Timeless End, last paragraph, last two sentences

"There is a hole in our belief systems that acting calls for us to fill with faith. We best settle such conflicts by competing to see which belief best helps us pursue Wisdom."

were changed to:

"We best settle this conflict by having these beliefs compete in the marketplace of beliefs for helping us pursue Wisdom."

Changes in Version 2011.10.31

Chapter 1, *Invariant Values*, first paragraph

"An obvious benefit of this multiple-frame approach to deciding well is that it allows us to use more of what we currently know about the world than any single-frame approach does. A less obvious benefit is that it extends the invariance of pursuing the timeless end of living well to pursuing all boundless factors of deciding well. These factors are the values we need

best to solve the problem that contains all other problems.[15] To choose other than these values is to choose to decide foolishly."

was changed to:

"An obvious benefit of this multiple-frame approach to deciding well is that it allows us to use more of what we currently know about the world than any single-frame approach does.[15] A less obvious benefit is that it extends the invariance of pursuing the timeless end of living well to pursuing all boundless factors of deciding well. To choose other than these invariant values is to choose to decide foolishly."

Chapter 2, *Pleasure and Pain*, last paragraph, last two sentences

"These tendencies create vicious circles of deprivation and deciding poorly. Together these circles form what we know as the cycle of poverty."

were changed to:

"These tendencies create vicious circles of deprivation and deciding poorly, which we commonly call the cycle of poverty."

Chapter 2, *Tools for Pursuing Wisdom*, second paragraph, fifth and sixth sentences

"In contrast, Aristotle asks us to look for moral virtue in others. He believed that moral virtue is the habit of wanting the right things, which we develop by acting as if we want the right things."

were changed to:

"In contrast, Aristotle believed that moral virtue is the habit of wanting the right things, which we develop by acting as if we want the right things. We discover these habits by observing successful people."

Chapter 3, *Public Entropy*, last paragraph, last three sentences

"Most of the problems we discover by removing non-knowledge resources from a decision process have solutions that fall within the bounds of our chosen problem. We may call these *normal problems*. Some have solutions that fall outside the bounds of the problem we believe we are addressing. We may call these *revolutionary problems.*"

were deleted.

Chapter 3, *Decision-Oriented Interpretations of Quantum Mechanics*, first paragraph

Changed "may" to "can" in the first sentence.

Chapter 3, *Decision-Oriented Interpretations of Quantum Mechanics*, second paragraph

Changed "the *Copenhagen class*" to "either the *Copenhagen class* or the *shut-up-and-calculate class*" in the fourth sentence.

Chapter 5, Liberalism, third paragraph

Changed "classical" to ""classical"" in the fourth sentence.

Deleted the last sentence:

"In the long run, nothing is more useful to us in pursuing happiness (the Good) than people who pursue Wisdom."

Chapter 6, A Common Timeless End, last paragraph

Changed "marketplace of beliefs" to "marketplace of ideas" in the last sentence.

Chapter 8, Complete Reason, first paragraph

Combined the two sentences in the Carl Sagan quote with an "and" conjunction.

Changes in Version 2011.11.05

Preface, sixth paragraph

Changed "virtuous circle" back to "virtuous circle of the division of labor and the expansion of market size" in the last sentence.

Preface, sixth paragraph

Changed "efficiency on all levels in all frames" to "removing ever more waste from the process" in the second sentence.

Changed "tool" to "beautiful tool" and "beautiful," to "" in the last sentence.

Chapter 1, Choosing Frames Well, last paragraph, footnote

Changed "larger" to ""larger"" in the third and fourth sentences (2 occurrences).

Changed "number of members" to "infinity" in the fourth sentence.

Removed numerals from the last sentence.

Chapter 1, *Steps for Building Multiple-Frame Models*, last paragraph, footnote, first three sentences

"The technique of reducing complex wholes to multiple frames opens more of our ability to recognize patterns to reason, thereby helping us better integrate these two abilities. According to the theory of language underlying this technique, we ought to be like pilots flying on instruments through a storm front. This "instrumental" theory of how we ought to use language contradicts the theory that we ought to use language to picture the world exactly as it is."

were changed to:

"According to the theory of language underlying this technique, we ought to be like pilots flying on instruments through a storm front. This "instrumental" theory of how we ought to use language contradicts the theory that we ought to use language to depict the world exactly as it is."

Chapter 3, Pursuing the Ring of Truth, last paragraph

Changed "Beautiful" to "Truly beautiful" in the last sentence.

Chapter 3, Contemplating the Way Forward, last paragraph, end

Added the footnote:

"[3] From the multiplex view, our need for simple models stems from our need to pursue Wisdom efficiently, not from the presumption that the Truth is knowable, or from the related reductionist precept that simpler models tend to be true."

Chapter 3, *Overcoming Constraints in Pursuing Wisdom*, first paragraph, footnote

"[4] We may call a process of reasoning that contains a complete means of refining itself *reasonably complete*. So conceived, the reason of pursuing Wisdom is reasonably complete."

was deleted.

Chapter 3, *A Decision-Tree Interpretation of Quantum Mechanics*, last paragraph, footnote

"[11] We may use the multiplex approach to pursuing Wisdom to organize our beliefs about the world. When we do, we discover not only conflicts but also holes in our belief systems. Regardless of the source of alternatives for resolving these conflicts or filling these holes, we ought to judge these alternatives by how well they ring true with our current beliefs about pursuing Wisdom."

was deleted.

Chapter 4, *Two Types of Ignorance*, first paragraph, last sentence

"We do so by testing the models that we use to predict by how well these models help us predict and by testing the models that we use to explain causation by how well these models help us find problems to solve in pursuing Wisdom."

was deleted.

Chapter 4, *Two Types of Ignorance*, second paragraph

"At the largest level of abstraction that we can imagine, the level of transcendent ends, there is nothing left to learn, hence no need for models that help us predict or explain on this level."

was changed to:

"We explain causation on lower levels of abstraction. On the lowest level of abstraction there exist no lower levels from which to explain."

Chapter 4, *Two Types of Ignorance*, last paragraph, first five sentences

"At the smallest level of abstraction that we can imagine, we cannot explain causation at a lower level. From the view of the Copenhagen class of interpretations of quantum mechanics, quantum mechanics is the lowest level of abstraction that we can imagine. Searching for models that explain causation on the level of quantum mechanics at a lower level is a waste of resources. From the view of the hidden-variables class, we can imagine levels of abstraction lower than the level of quantum mechanics. Searching for models that explain causation on the level of quantum mechanics at a lower level may not be a waste of resources."

were changed to:

"From the view of the Copenhagen class of interpretations of quantum mechanics, quantum mechanics is the lowest level of abstraction that we can imagine. Searching for models that explain causation on the level of quantum mechanics at a lower level is a waste of resources."

Chapter 4, *Two Types of Ignorance*, last paragraph, footnote

"[5] From the multiplex view, pursuing Wisdom is a self-similar, self-referential process. Invariant science contains its own metascience."

was deleted.

Chapter 4, *A Crude Look at the Whole*, second paragraph, first three sentences

"The unrelenting pressure to replace non-knowledge resources with knowledge resources suggests the metaphor of a near-freezing river filled with blocks of ice of various shapes and sizes, which represent parts of our networks of knowledge-in-use. In complexity science terms, these blocks are "frozen accidents.""

were changed to:

"The way we replace non-knowledge resources with knowledge resources is, in part, accidental. The pressure to create these "frozen accidents" suggests the metaphor of a near-freezing river filled with blocks of ice of various shapes and sizes."

Chapter 7, *A Revolutionary Anomaly*, last paragraph, last sentence

"People who base their decisions on temporal values, values based on the false belief that it is possible to separate problems from the problem that contains all other problems, act irrationally."

was changed to:

"Only by addressing the problem that contains all other problems can we remove the logs from our eyes. When we find problems to solve based on the false belief that it is possible to separate our problems from the problem that contains all other problems, we act irrationally."

Chapter 7, *Temporal OODA Loop Analysis*, first paragraph

Changed "talents as a synthesizer of ideas" to "great ability to relate ideas" in the last sentence.

Chapter 7, *Temporal OODA Loop Analysis*, second paragraph, footnote

"[11] To address strategic problems using his inherently tactical model of deciding well, Boyd needed a timeless basis. He chose surviving and thriving on our own terms. This choice tends to blind us to seeking to cooperate well before we seek to compete well."

was deleted.

Chapter 7, *Timeless OODA Loop Analysis*, first paragraph

Changed "better to survive on our own terms" to "to compete well" in the last sentence.

Chapter 8, Useful Reasoning, first paragraph, last sentence

"The multiplex reasoning of deciding well concerns efficiency functioning on all levels of all frames of deciding well."

was changed to:

"Such is the efficiency of zero public entropy."

Changes in Version 2011.11.11

Chapter 1, Useful Frames, second paragraph, third paragraph

"To decide well is to decide efficiently."

was deleted.

Chapter 1, Useful Frames, third paragraph, third paragraph

"To decide well is to decide both efficiently and effectively."

was deleted.

Chapter 1, Values, first paragraph

Changed "values that we use to choose problems to solve" to "values" in the last sentence.

Added the sentences:

"Temporal values are values we base on what we currently know. Timeless values are values we base on all that can be known."

Chapter 1, Values, last paragraph, footnote

Changed "third, seventh, and eighth" to "last two" in the last sentence.

Chapter 1, *Steps for Building Multiple-Frame Models*, last paragraph, footnote

"[13] According to the theory of language underlying this technique, we ought to be like pilots flying on instruments through a storm front. This "instrumental" theory of how we ought to use language contradicts the theory that we ought to use language to depict the world exactly as it is. According to the most modern form of this "pictorial" theory of language, which is that Ludwig Wittgenstein's 1921 work, *Tractatus Logico-Philosophicus*, we ought to be like painters using a *camera obscura* to record a still-life scene well. For more about the difference between the instrumental and pictorial theories of language, see the last chapter."

was moved to the sixth paragraph of the Values subsection and changed to:

"[13] According to this "instrumental" approach to language, we use language to help us choose the best path forward. We are as pilots flying on instruments through a storm. In contrast,

according to the most modern form of the "pictorial" approach to language, which is that of Ludwig Wittgenstein's *Tractatus Logico-Philosophicus*, we use language to depict the world exactly how it is. We are as painters using a *camera obscura* to record a still-life scene. For more about these two approaches, see the last chapter."

Chapter 3, *Public Entropy*, second paragraph

"There are a nearly infinite number of ways for people to decide foolishly, but only one way for people to decide perfectly. Individual people tend to become more predictable the better they decide. Further, they tend to work together more coherently the better they decide. Consider how a squad of raw recruits would act if forced by circumstances into combat against a superior force. Although we cannot predict exactly how these people will act, we can predict that they will not act as a unit, as a single entity. Now consider how a squad of seasoned special forces soldiers would act under the same circumstances. To defeat a superior force, they need to act unpredictably. Although we cannot predict exactly how these people will act, we can predict that they will act as a unit, as a single entity.[7]"

"[7] Modern economists such as Paul Samuelson were right to look to thermodynamics for models of how large groups of people will act, but were wrong to look to classical thermodynamics. To explain what happens in economies, which includes what happens as we learn to live ever more wisely, we need to explain based not on what happens at the margins, but rather on what happens as we create knowledge, which calls for us to consider what happens in the infinitely long run. Studying what happens to people in the infinitely long run is the equivalent of studying what happens in physics at near absolute zero temperature. A group of people working together perfectly is the public analogue of a Bose-Einstein condensate. As we learn to decide ever more wisely, we learn to work together ever more wisely. The process of learning to work together ever more wisely is not continuous. A bit more knowledge may have no effect or a very large effect. Imagine a battalion of raw recruits. Now imagine that we begin to replace raw recruits with seasoned special forces one person at a time. Each replacement may have no effect, some effect, or a large effect on the ability of soldiers in the battalion to act as a unit. Physical analogues of large effects include transitions to superconductivity and superfluidity."

was changed to:

"Modern economists such as Paul Samuelson were right to look to thermodynamics for models of how large groups of people will act, but were wrong to look to classical thermodynamics. To explain what happens in economies, which includes what happens as we learn to live ever more wisely, we need to explain based not on what happens at the margins, but rather on what happens as we create knowledge, which calls for us to consider what happens in the infinitely long run. Studying what happens to people in the infinitely long run is the equivalent of studying what happens in physics at near absolute zero temperature. A group of people working together perfectly is the public analogue of a Bose-Einstein condensate.[7] As we learn to decide ever more wisely, we learn to work together ever more wisely. The process of learning to work together ever more wisely is not continuous. A bit more knowledge may have no effect or a very large effect. Imagine a battalion of raw

recruits. Now imagine that we begin to replace raw recruits with seasoned special forces one person at a time. Each replacement may have no effect, some effect, or a large effect on the ability of soldiers in the battalion to act as a unit. Physical analogues of large effects include transitions to superconductivity and superfluidity."

"[7] A Bose-Einstein condensate is the state of matter of a group of weakly interacting bosons (quantum-level objects with integer spin) very close to their lowest energy state. In this state, groups of bosons act as if they were a single boson."

Chapter 3, *Decision-Oriented Interpretations of Quantum Mechanics*, first paragraph

Changed "problem that contains all other problems" to "problem that contains all other problems in pursuing Wisdom" in the second sentence.

Changed "all of our beliefs" to "the most beautiful of competing beliefs" in the third sentence of the footnote.

Chapter 3, *Decision-Oriented Interpretations of Quantum Mechanics*, last paragraph

Added the footnote:

"[10] This presumes that the Universe has both a beginning and an end. If not, the term "a nearly infinite number" should be "an infinite number." Consider the simple case in which the Universe has a beginning but no end. The first time a microscopic particle transitions from acting like a wave to acting like a particle is like subtracting the set of all rational numbers with a denominator of 1 from the set of all rational numbers. The second time a microscopic particle makes this transition is like subtracting the set of all rational numbers with a denominator of 2 from the remaining set of rational numbers. The third time is like subtracting the set of all rational numbers with the denominator of 3 from the remaining set of rational. We can see from this simple model that regardless of how many transitions have occurred since the beginning of time there remain an infinite number of future possible states of the world."

Chapter 3, *A Decision-Tree Interpretation of Quantum Mechanics*, last paragraph

Deleted the third sentence: "From the view of what we currently call the natural sciences, communicating at greater than light speed does not ring true with what else we currently believe we know about the natural sciences; hence investing in such a research program would likely be foolish."

Changed "most beautiful" to "better" in the second to last sentence.

Chapter 4, Refining Everyday Thinking, third paragraph

Changed "The classic example" to "A classic example" in the sixth sentence.

Chapter 4, Refining Everyday Thinking, fifth paragraph, footnote

Changed "speeds" to "speeds relative to one another" in the last sentence.

Chapter 4, Refining Everyday Thinking, eighth paragraph

Inserted the subsection heading "***Recursivity***."

Chapter 4, *Recursivity*, last paragraph

Changed "is an opportunity" to "provides us with opportunities" in the last sentence.

Chapter 4, *Recursivity*, last paragraph, footnote, last three sentences

"The modern scientists Kuhn studied cared about believing well per se. In contrast, the people who shifted Kuhn's paradigm cared about believing well in order to decide well. They took a pragmatic view."

was changed to:

"The people who shifted Kuhn's paradigm took a pragmatic view."

Chapter 4, *Two Types of Ignorance*, entire subsection

"***Two Types of Ignorance***
We may think of science as the process of ridding ourselves of ever more ignorance about the world. This ignorance takes the form of uncertain predictions and incomplete explanations of causation. In pursuing the timeless end of believing well, we need to address both of these types of ignorance.

"We explain causation on lower levels of abstraction. On the lowest level of abstraction, there exist no lower levels of abstraction from which to explain.

"From the view of the Copenhagen class of interpretations of quantum mechanics, quantum mechanics is the lowest level of abstraction that we can imagine. Searching for models that explain causation on the level of quantum mechanics at a lower level is a waste of resources. From the view of the decision class, we ought to search lower levels for models that explain causation on the level of quantum mechanics *wisely*. More than one explanation may fit what we can sense.[4] We ought to choose among these the explanation that best helps us pursue Wisdom."

was changed to:

"***Self-Similarity***
We may think of science as the process of ridding ourselves of ever more ignorance about the world. This ignorance takes the form of uncertain predictions and incomplete explanations of

causation. In pursuing the timeless end of believing well, we need to address both types of ignorance.

"We explain causation on lower levels of abstraction than the level we are trying to explain. When we choose a problem to solve, we choose to accept our current explanations of causation on the level of our chosen problem and on all higher levels. In effect, we choose to ignore our ignorance of causation on the level of our chosen problem and above. We embed this ignorance into our networks of knowledge in use.

"On the lowest level of abstraction, there exist no lower levels of abstraction from which to explain. From the view of the Copenhagen class of interpretations of quantum mechanics, quantum mechanics is the lowest level of abstraction that we can imagine. Searching for models that explain causation on the level of quantum mechanics at a lower level is a waste of resources. From the view of the decision class, we ought to search lower levels for models that explain causation on the level of quantum mechanics *wisely*. More than one explanation may fit what we can sense.[4] We ought to choose among these the explanation that best helps us pursue Wisdom."

Chapter 4, *A Crude Look at the Whole*, first paragraph, middle footnote

Removed numbering from last sentence.

Chapter 4, *A Crude Look at the Whole*, first paragraph, last footnote

Deleted the first two sentences: "The structure and dynamics of our networks of knowledge-in-use are a great mystery. We may speculate that the viscosity of economic flows varies inversely with the quality of decision-making."

Deleted "also" from the new first sentence.

Added the sentence: "For more on this, see the last chapter."

Chapter 4, Useful Reminders, second paragraph

Changed "do often" to "often" in the third sentence.

Chapter 5, Promote Savings for Welfare, last paragraph, first footnote

"[16] From the view of modern economics, our interest in how others choose to live is external to the problem of how best to allocate scarce resources. The modern economic solution to this externality problem involves making all information about how we choose to live our lives knowable to all. Compared to the loss of all privacy, the universal welfare savings plan and highly progressive taxation solution does not look so onerous. From the multiplex view, the natural distribution of income of people deciding well is likely to follow an inverse power law. If so, policies for redistributing income will hinder pursuing Wisdom. Far better are policies for promoting the pursuit of Wisdom."

was deleted.

Chapter 6, *Worldly Benefits of Detachment*, first paragraph

"Schweitzer recognized the worldly benefit of embracing the world and life, but he ignored the worldly benefits of denying the world and life by detaching ourselves from them."

was appended to the second paragraph and changed to:

"Schweitzer's modern view of mystical oneness ignores the worldly benefits of denying the world and life."

Chapter 6, *Worldly Benefits of Detachment*, last paragraph

Changed "system of beliefs, including the concepts underlying our beliefs" to "belief systems" in the third sentence.

Changed "system of beliefs" to "beliefs" in the seventh sentence (2 occurrences).

Chapter 7, *A Revolutionary Anomaly*, last paragraph

Changed "problem that contains all problems" to "problem that contains all other problems in pursuing Wisdom" in the second sentence.

Changed "the problem that contains all other problems" to "this universal problem" in the third and last sentences (2 occurrences).

Switched the order of the last two sentences.

Chapter 7, The Scope of Strategy, entire section

Merged the first and last paragraphs.

Chapter 8, Complete Reasoning, first paragraph

Changed "do not find" to "never find" in the fourth sentence.

Changed "problem that contains all other problems" to "problem that contains all other problems in pursuing Wisdom" in the eighth sentence.

Changes in Version 2011.11.28

Chapter 1, Choosing Frame Well, last paragraph, last sentence

"In the words of Dwight Eisenhower, "If a problem cannot be solved, expand it.""

was moved into the end of the footnote.

Chapter 1, Useful Frames, first paragraph

Changed "We" to "Because processes have no bounds in time, we" in the fourth sentence.

Changed "We" to "Because events have bounds in time, we" in the seventh sentence.

Chapter 1, *The Need for Timeless Frames*, third paragraph, end

Added the footnote:

"[11] In his general relativity theory ("theory of invariance"), Einstein has us view physics from a four-dimensional ("space-time") frame. As we shall see, the boundlessly pragmatic approach to deciding well put forth in this work has us view the process of refining everyday thinking ("the whole of science") from a four-dimensional frame. This boundlessly pragmatic approach calls for us to replace formal logic with a concept of reason that surpasses formal logic. Einstein's close friend, Kurt Gödel, sought to surpass formal logic by proving the existence of intuition. In contrast, this pragmatic approach surpasses formal logic by demonstrating the usefulness of a concept of beauty based on the symmetry of pursuing the timeless end of deciding well."

Chapter 1, Values, fifth paragraph, footnote

Changed "Allowing for experience" to "Allowing experience" in the first sentence.

Chapter 1, *Steps for Building Multiple-Frame Models*, last paragraph, last sentence

"Like the Toyota system, it helps us break down overwhelmingly complex problems into problems we can solve."

was promoted to a new paragraph and changed to:

"Like the Toyota system, this multiple-frame approach to deciding well helps us break down overwhelmingly complex problems into problems we can solve. As we shall see, it helps us find not only conflicts but also holes in our belief systems."

Chapter 1, *Steps for Building Multiple-Frame Models*, last paragraph, footnote

Changed "Logical completeness is a means to efficiency" to "Logic is a means to Wisdom" in the fourth sentence.

Deleted the last sentence: "For more about logical completeness, see the last two chapters."

Changes in Version 2011.11.30

Preface, fourth paragraph

Changed "construct" to "build" and "building" to "constructing" in the second sentence.

Changed "build" to "construct" in the third sentence.

Chapter 1, Values, second paragraph

Changed "linking or re-linking" to "linking (or re-linking)" in the last sentence.

Chapter 1, *The Need for Timeless Frames*, third paragraph, footnote

Changed "four-dimensional" to "four-dimensional ("reasonably-complete")" in the second sentence.

Chapter 2, *Pleasure and Pain*, second to last paragraph

Changed "to construct" to "to" in the last sentence.

Chapter 2, *Tools for Pursuing Pleasure and Joy*, last paragraph

Changed "hence to" to "to help us to" in the second to last sentence.

Changed ", Dante's seven deadly sins:" to ":" in the last sentence.

Chapter 2, *Chicago Screwdrivers*, entire section

Deleted the title and moved the paragraph to the end of the chapter.

Chapter 2, *Three Common Mistakes*, second paragraph

Changed "people" to "us" in the second sentence.

Chapter 3, Contemplating the Way Forward, first paragraph

Changed "beautifully" to "well" in the last sentence (2 occurrences).

Chapter 3, *Overcoming Constraints in Pursuing Wisdom*, second paragraph

Changed "compute π" to "compute π to any number of decimal places" in the first and last sentences (2 occurrences).

Chapter 3, *Public Entropy*, first paragraph, last two sentences

"We may call this measure *public entropy* and the transcendental end of the process of lowering this measure *zero public entropy*. Zero public entropy is the dynamic analogue of and alternative to Pareto optimality.[6]"

"[6] Pareto optimality is the state of the world in which it is impossible to make any person better off without making at least one other person worse off."

were changed to:

"We may call this measure *public entropy* and the transcendental end of the process of lowering this measure *zero public entropy*.[6]"

"[6] Zero public entropy is the dynamic analogue of and alternative to Pareto optimality, the state of the world in which it is impossible to make any person better off without making at least one other person worse off."

Chapter 3, *Public Entropy*, second paragraph, second through fourth sentences

"To explain what happens in economies, which includes what happens as we learn to live ever more wisely, we need to explain based not on what happens at the margins, but rather on what happens as we create knowledge, which calls for us to consider what happens in the infinitely long run. Studying what happens to people in the infinitely long run is the equivalent of studying what happens in physics at near absolute zero temperature. A group of people working together perfectly is the public analogue of a Bose-Einstein condensate.[7]"

"[7] A Bose-Einstein condensate is the state of matter of a group of weakly interacting bosons (quantum-level objects with integer spin) very close to their lowest energy state. In this state, groups of bosons act as if they were a single boson."

were changed to:

"To explain what happens in economies, which includes what happens as we learn to live ever more wisely, we need to explain based not on what happens at the margins, but rather on what happens in the infinitely long run.[7]"

"[7] Studying what happens to people in the infinitely long run is like studying what happens in physics at near absolute zero temperature. People working together perfectly act as if they were a single person deciding perfectly. Weakly interacting bosons (quantum-level objects with integer spin) at their lowest energy state act as if they were a single boson."

Chapter 3, *A Decision-Tree Interpretation of Quantum Mechanics*, second paragraph

Changed "this interpretation" to "it" in the second sentence.

Chapter 3, The Elephant in the Room, first paragraph

Changed "link or re-link" to "link" in the first sentence.

Chapter 4, Refining Deciding Well, fourth paragraph, footnote

Changed "link or re-link" to "link" in the fourth sentence.

Chapter 6, *Schweitzer's Universal Spiritual Need*, last paragraph, last sentence

"From behind this veil, zero public entropy is all people deciding perfectly."

was deleted.

Chapter 6, *Einstein's Twin Warnings*, first paragraph

Changed "link or re-link" to "link" in the second sentence.

Chapter 7, *Timeless OODA Loop Analysis*, first paragraph, fourth sentence

"This is a biological concept."

was deleted.

Chapter 8, Useful Reasoning, first paragraph

Changed "problems" to "given problems" in the second sentence.

Changes in Version 2011.12.05

Acknowledgments, last paragraph

Changed "Comptroller of the Department of Defense under its first six secretaries" to "special assistant to the first secretary of the Department of Defense (1947–49)and comptroller under its next five secretaries" in the third sentence.

Preface, last paragraph, last two sentences

"Many will want to dismiss it as a timeless mishmash, as a disordered collection of ideas from all ages. It has order, but not the order that they have learned to expect."

were changed to:

"Its reason is not the reason that most people have learned to expect."

Chapter 1, Ever More Complete Multiple-Frame Models, last paragraph, footnote

Changed "Logic" back to "Logical completeness" in the fourth sentence.

Chapter 1, *Steps for Building Multiple-Frame Models*, fifth paragraph, last sentence and paragraph break

"It provides us with a more robust means of learning by doing." and paragraph break were deleted.

Chapter 2, Pleasure and Pain, first paragraph, last two sentences

"We often experience pain at the start of healthy exercise. We often experience pleasure when eating unhealthy foods."

were changed to:

"For example, we often experience pain at the start of healthy exercise and pleasure when eating unhealthy foods."

Chapter 2, *Three Common Mistakes*, second paragraph

Changed "This" to "As we shall see, this" in the last sentence.

Chapter 2, A Strategy for Learning Well, last paragraph

"As we saw in the EOQ/RTS example, using temporal tools for finding problems to solve tends to blind us to the best problem to solve. Just as we ought never to use hammers to drive in screws, we ought never to use temporal tools to find problems to solve. One of the greatest dangers of this comes from using modern economic tools to find problems to solve. Consider the concepts of human capital, work, and leisure. From the temporal view of modern economics, human capital is knowledge that raises our income; work is an *unpleasant* activity that others pay people to perform; and leisure is time spent not working. People aim to *please* themselves by consuming economic goods during their leisure time. They work in order to consume. Living well calls for them to *balance* work and leisure. In contrast, from the multiplex view, human capital is knowledge that helps us to satisfy our needs; work is *any* activity that others pay us to perform; and leisure is time spent satisfying our needs. We aim to *enjoy* ourselves by pursuing the virtuous circle of pleasure and joy. We work in order to live well. Living well calls for us to *combine* work and leisure. In religious terms, finding our true calling is a blessing."

was changed back to a subsection and inserted in front of the ***Tools for Pursuing Wisdom*** subsection:

"***Chicago Screwdrivers***
As we saw in the EOQ/RTS example, using temporal tools for finding problems to solve tends to blind us to the best problem to solve. Just as we ought never to use hammers to drive in screws, we ought never to use temporal tools to find problems to solve. One of the greatest dangers of this comes from using modern economic tools to find problems to solve. Consider the concepts of work and leisure. From the temporal view of modern economics, work is *unpleasant* activity that others pay people to perform and leisure is time spent not working. People work in order to satisfy their *wants*. Satisfying wants calls for them to *balancing* work and leisure. In contrast, from the multiplex view, work is *any* activity that others pay us to perform and leisure is time spent satisfying our *needs*. We work in order to live well. Living well calls for *combining* work and leisure. In religious terms, finding our true calling is a blessing."

Chapter 4, Refining Everyday Thinking, fourth paragraph

"Two rules arise from the distinction between descriptions we use to predict and descriptions we use to explain. First, we ought to use the term 'cause' only with descriptions that we use to explain. We explain causes. 'Cause' is a cue for a tool for helping us to find problems to solve within a given set of conditions. Second, we need not worry about the realism of the descriptions that we use to predict. We need realism to help us find problems to solve, not to help us predict."

was deleted.

Chapter 4, A Crude Look at the Whole, first paragraph, footnote

"[11] We may speculate that the release of stress from these networks has a probability distribution with a fat tail. For a clear and concise explanation of why this is important, see the March 23, 2006 *Financial Times* article by Benoît Mandelbrot and Nassim Taleb titled "A Focus on Exceptions that Prove the Rule," available online at <http://www.ft.com/cms/s/2/5372968a-ba82-11da-980d-0000779e2340,dwp_uuid=77a9a0e8-b442-11da-bd61-0000779e2340.html> (14 October 2011). For more on this, see the last chapter."

was changed to:

"[11] Given the self-similarity of pursuing Wisdom, we may speculate that the release of stress from these networks follows a power-law distribution. For more on power-law distributions in pursuing Wisdom, see the last chapter."

Chapter 4, *A Crude Look at the Whole*, second paragraph

Changed "prevent embacles by pursuing Wisdom" to "best prevent embacles by deciding well using the multiple-frame approach to pursuing Wisdom" in the last sentence.

Chapter 4, Useful Reminders, last paragraph

Changed "Finally, pursuing" to "Pursuing" in the first sentence.

Chapter 5, *Promote Pursuing Wisdom, not Temporal Order*, second paragraph

Changed "twenty" to "twenty-five" in the last sentence.

Chapter 5, Liberalism, fourth paragraph

Changed "boyhood home" to "hometown of Boston" in the second sentence.

Chapter 6, A Common Timeless End, second paragraph, first sentence

"We may call the timeless end of satisfying our need for mystical oneness *Wholeness*."

was inserted in front of the last sentence of the first paragraph.

Chapter 6, A Common Timeless End, last paragraph

Changed "the modern" to "a logical" in the first sentence.

Chapter 7, *A Revolutionary Anomaly*, first paragraph

Changed "ought" to "the solution to the anomaly he discovered was for" in the first sentence.

Deleted "common ground, for" from the first sentence.

Chapter 7, *A Revolutionary Anomaly*, last paragraph

Changed "common ground" to "common ground based on symmetry" in the first sentence.

Chapter 8, Complete Reasoning, last paragraph

Changed "complete means of refining itself" to "self-referential means of refining itself (a means of refining itself that contains a means of refining itself that contains a means of refining itself...)" in the second sentence.

Chapter 8, Natural Reasoning, first paragraph

Changed "better view" to "better" in the last sentence.

Chapter 8, Summary, first paragraph

Added paragraph break before the second to last sentence.

Changed "characterize" back to "seem to characterize" in the first sentence of the new last paragraph.

Changes in Version 2011.12.10

Chapter 1, *The EOQ/RTS Example*, fourth paragraph, sixth sentence

"We cannot price useful knowledge by measuring the value of the resources it replaces, except in the special case in which we know exactly when and how we will use the knowledge."

was changed to:

"Except in the special case in which we know exactly when and how we will use the knowledge, we cannot price useful knowledge by measuring the value of the resources it replaces."

Chapter 1, *The Need for Timeless Frames*, first paragraph

Changed "who are locked" to "who have locked themselves into" in the first sentence.

Chapter 1, Values, first paragraph

Changed "all that can be known" to "what we need to know in order to pursue timeless ends well" in the last sentence.

Chapter 1, Values, third paragraph

Changed "aspire to learn" to "need to know in order to pursue timeless ends well" in the fifth sentence.

Chapter 1, *The Need for Timeless Frames*, third paragraph, footnote

"[11] In his general relativity theory ("theory of invariance"), Einstein has us view physics from a four-dimensional ("space-time") frame. As we shall see, the boundlessly pragmatic approach to deciding well put forth in this work has us view the process of refining everyday thinking ("the whole of science") from a four-dimensional ("reasonably-complete") frame. This boundlessly pragmatic approach calls for us to replace formal logic with a concept of reason that surpasses formal logic. Einstein's close friend, Kurt Gödel, sought to surpass formal logic by proving the existence of intuition. In contrast, this pragmatic approach surpasses formal logic by demonstrating the usefulness of a concept of beauty based on the symmetry of pursuing the timeless end of deciding well."

was changed to:

"[11] In his theory of invariance ("relativity theory"), Einstein has us view physics from a four-dimensional ("space-time") frame. As we shall see, the boundlessly pragmatic approach to

deciding well put forth in this work has us view the process of refining everyday thinking ("the whole of science") from a four-dimensional ("reasonably-complete") frame, which uses a concept of reason that surpasses logic. We base the super-logical part of this reason not on the intuition that Kurt Gödel failed to prove exists, but rather on the symmetry of pursuing the timeless end of deciding well."

Chapter 1, *Steps for Building Multiple-Frame Models*, fourth paragraph, last three sentences

"Regrettably, we lack the knowledge to pursue them perfectly. This includes the knowledge of how to think clearly across frames. Because we lack the knowledge of how to think clearly across frames, it useful for us to think of pursuing Wisdom and the Truth as separate pursuits, each subject to its own set of problems."

were changed to:

"Regrettably, we lack the knowledge of how to think perfectly across frames. Because we lack this knowledge, it useful for us to think of pursuing Wisdom and the Truth as separate pursuits, each subject to its own set of problems."

Chapter 1, *Steps for Building Multiple-Frame Models*, last paragraph, last two sentences

"Like the Toyota system, this multiple-frame approach to deciding well helps us break down overwhelmingly complex problems into problems we can solve. As we shall see, it helps us find not only conflicts but also holes in our belief systems."

were changed to:

"As we shall see, this multiple-frame approach to deciding well helps us find not only conflicts but also holes in our belief systems."

Chapter 3, *Overcoming Constraints in Pursuing Wisdom*, third paragraph

Changed "10^{12} (a trillion)" to "a trillion (10^{12})" in the first sentence.

Chapter 3, *Overcoming Constraints in Pursuing Wisdom*, fourth paragraph

Changed "10^{24} (a trillion squared)" to "a trillion squared (10^{24})" in the first sentence.

Chapter 3, *Overcoming Constraints in Pursuing Wisdom*, last paragraph

Changed "10^{24}" to "a trillion squared" in the last sentence.

Chapter 3, Public Entropy, second paragraph, first two sentences, including footnote

"Modern economists such as Paul Samuelson were right to look to thermodynamics for models of how large groups of people will act, but were wrong to look to classical thermodynamics. To explain what happens in economies, which includes what happens as we learn to live ever more wisely, we need to explain based not on what happens at the margins, but rather on what happens in the infinitely long run.[7]"

"[7] Studying what happens to people in the infinitely long run is like studying what happens in physics at near absolute zero temperature. People working together perfectly act as if they were a single person deciding perfectly. Weakly interacting bosons (quantum-level objects with integer spin) at their lowest energy state act as if they were a single boson."

were changed to:

"To explain what happens in economies, which includes what happens as we learn to live ever more wisely, we need to explain based not on what happens at the margins, but rather on what happens in the infinitely long run.[7]"

"[7] Modern economists such as Paul Samuelson were right to look to thermodynamics for models, but were wrong to look to classical thermodynamics. Studying what happens to people in the infinitely long run is like studying what happens in physics at near absolute zero temperature. People working together perfectly act as if they were a single person deciding perfectly. Similarly, weakly interacting bosons (quantum-level objects with integer spin) at their lowest energy state act as if they were a single boson."

Chapter 3, *Three Approaches to Policy*, last paragraph

Changed "knowledge" to "wisdom" in the last sentence.

Chapter 3, The Elephant in the Room, third paragraph

Changed "a research program" to "and so" in the last sentence.

Chapter 4, Refining Everyday Thinking, fourth paragraph, footnote, last sentence

"Newtonian mechanics is good for predicting the behavior of large items moving at low speeds, but poor at predicting either the behavior of very small objects or the behavior of objects moving at very high speeds relative to one another."

was changed to:

"Newtonian mechanics is good for predicting the behavior of large objects moving at low speeds, but poor at predicting the behavior of very small objects or objects moving at very high speeds."

Chapter 4, *Recursivity*, last paragraph

Changed "the view" to "the modern view" in the second sentence.

Changed "is a waste of resources" to "wastes resources" in the third sentence.

Changed "From the view" to "In contrast, from the multiplex view" in the fourth sentence.

Changed "choose among these" to "choose" in the last sentence.

Chapter 4, *Academic Fields*, second paragraph

Changed "the" to "this" in the second sentence.

Chapter 4, *Academic Fields*, fourth paragraph

Changed "it" to "they" in the last sentence.

Chapter 6, *Schweitzer's Universal Spiritual Need*, third paragraph, last two sentences

"We see this in ancient Hinduism's failure to explain adequately how merit (*karma*), which concerns our relation with the infinite Being, relates to worldly duty (*dharma*), which concerns our relation with life. The resulting caste system greatly hindered progress toward Wisdom."

were deleted. Merged paragraph with the following paragraph.

Chapter 6, *Schweitzer's Universal Spiritual Need*, new third paragraph, sixth sentence

"Incomplete forms of ethical mysticism include those of such modern Western movements as nationalism, socialism, national socialism, international socialism, and communism."

was deleted.

Chapter 6, *Schweitzer's Universal Spiritual Need*, last paragraph

Changed "revering life well" to "justice" in the first sentence.

Chapter 6, *Einstein's Twin Warnings*, first paragraph

Changed "the words of Einstein:" to "Einstein's words" in the fourth sentence.

Chapter 6, A Common Timeless End, last paragraph, last two sentences

"From the multiplex view, the reason these two beliefs conflict is that we do not know which is the better belief. We best settle this conflict by having these beliefs compete in the marketplace of ideas for helping us pursue Wisdom."

were changed to:

"From the multiplex view, we best settle this conflict by having these beliefs compete in the marketplace of tools for helping us pursue Wisdom."

Chapter 8, Complete Reasoning, first paragraph

Changed "prove" to "disprove" in the fourth through seventh sentences (three occurrences).

Deleted the first sentence of the footnote: "Note that these two arguments parallel the basic arguments Kurt Gödel used in his incompleteness theorems."

Changed "Note too" to "Note" in the new first sentence of the footnote.

Chapter 8, Complete Reasoning, last paragraph, footnote

Changed "Truth market" to "market for tools for helping us *believe* well" in the second sentence.

Changed "Truth market" to "market for tools for helping us *decide* well" in the seventh sentence.

Changes in Version 2011.12.16

Chapter 1, Choosing Frames Well, last paragraph, footnote

Changed "Later, Kurt Gödel" to "Kurt Gödel later" in the seventh sentence.

Chapter 1, *Invariant Values*, first paragraph

Changed "to decide foolishly" to "to blind ourselves to the full range of opportunities for learning by doing" in the last sentence.

Chapter 3, Contemplating the Way Forward, all five paragraphs

"Pursuing Wisdom calls for us to think beautifully about how to decide well. We can use the concept of *transcendental recursive objects* to help us to contemplate well about deciding well.

"Recursive objects are objects that we know better by means of a cycle of steps in which the result of one cycle becomes the basis for the next cycle. We may think of these recursive processes as having three basic parts. The first is the cycle of steps that we apply repeatedly; the second is the result of each cycle; and the third is the result of the process.

"Consider the problem of dividing a bag of marbles equally among six children. We can solve this simple problem using a recursive process that ends. The steps in this process are removing six marbles from the bag; giving each child a marble; and repeating the first two steps until there are less than six marbles in the bag. In this simple example, the result of each cycle is the number of marbles each child has received, and the result of the process is the number of marbles each child will receive.

"Complete knowledge of some recursive objects will always transcend our knowledge of them. We can never know these objects completely. The best we can do is to find a recursive process that will yield ever better approximations of them. The mathematical constant π is one such object. We can define π exactly (as the ratio of the circumference to the diameter of a Euclidean circle), but can never reduce π to an algebraic expression. Wisdom is another such object. We can define Wisdom exactly (as knowledge that allows a being to decide perfectly), but we can never reduce Wisdom to a logical expression.

"Because the recursive process for knowing transcendent objects is endless, we may reasonably call the result of a cycle its *timeless end* and the result of the process its *transcendent end*. In computing π, the timeless and transcendent ends are both numbers. In pursuing Wisdom, the timeless end is ever better approximations of Wisdom and the transcendental end is complete knowledge of Wisdom. The form of the timeless end is a set of partial descriptions of the world. These descriptions ought to be as simple as possible, but not simpler; and the set of descriptions ought to be as small as possible, but not smaller.[2] The form of the transcendental end is the most useful form for a perfectly wise being in deciding well.[3]"

were changed to:

"Pursuing Wisdom calls for us to contemplate well about deciding well. We can use the concept of a *transcendental recursive object* to help us to do so.

"To understand the concept of a *transcendental recursive object*, we need to understand recursive processes, programs, and objects. A *recursive process* is a sequence of steps in which the result of one cycle through these steps becomes the basis for the next cycle. A recursive program is a recursive process that contains a step that halts the process when a given condition is true. A recursive object is an object that we come to know by means of a recursive program. Consider the problem of dividing a bag of marbles equally among six children. We can solve this simple problem using a recursive process that halts when there are less than six marbles in the bag. The steps in this process are removing six marbles from the bag; giving each child a marble; halting if there are less than six marbles in the bag; and repeating the first three steps. In this simple example, the recursive object is the number of marbles each child will receive.

"Complete knowledge of some recursive objects will always transcend our knowledge of them. The best we can do is to find a recursive process that will yield ever better approximations of them. The mathematical constant π is one such object. We can define π exactly as the ratio of the circumference to the diameter of a Euclidean circle, but can never

reduce π to an algebraic expression. Wisdom is another such object. We can define Wisdom exactly as knowledge that allows a being to decide perfectly, but we can never reduce Wisdom to a logical expression.

"Many recursive processes will yield ever better approximations of π. We can use what we believe is the best of these processes to create a recursive program for producing ever better approximations of π. We may call the ever better approximates of π the *timeless end* of this program. The form of this end is a number. We may also call the complete knowledge of π the *transcendental end* of this program. The form of this end is also a number.

"Similarly, many recursive processes will yield ever better approximations of Wisdom. We can use what we believe is the best of these processes to create a recursive program for producing ever better approximations of Wisdom. We may call the ever better approximates of Wisdom the *timeless end* of this program. The form of this end is a set of partial descriptions of the world. These descriptions ought to be as simple as possible, but not simpler; and the set of descriptions ought to be as small as possible, but not smaller.[2] We may also call complete knowledge of Wisdom the *transcendental end* of this program. The form of this end is the most useful form for a perfectly wise being in deciding well.[3]"

Chapter 3, *Public Entropy*, second paragraph

Changed "seasoned special forces" to "highly-trained, seasoned soldiers" in the sixth sentence.

Chapter 3, *Decision-Oriented Interpretations of Quantum Mechanics*, last paragraph, footnote, first two sentences

"This presumes that the Universe has both a beginning and an end. If not, the term "a nearly infinite number" should be "an infinite number.""

were changed to:

"If the world is infinite, then the terms 'a nearly infinite number' should be 'an infinite number.'"

Chapter 3, *Decision-Oriented Interpretations of Quantum Mechanics*, last paragraph, footnote

Changed "Universe" to "world" in the new second sentence.

Changed "future possible" to "possible" in the last sentence.

Chapter 7, The Scope of Game Theory, first paragraph, first footnote

Changed "on recursion" to "about recursion" in the first sentence.

Chapter 8, Complete Reasoning, last paragraph

Changed "(a means of refining itself that contains a means of refining itself that contains a means of refining itself...)" to ", which is to say a process of reasoning that contains a means of refining itself that contains a means of refining itself that contains a means of refining itself...," in the first sentence.

Changes in Version 2011.12.17

Preface, seventh paragraph, last sentence

"Lovers of wisdom may find in this concept a beautiful tool for describing the ideal way toward all that is wise, hence toward all that is good, true, and just."

was deleted.

Chapter 3, Contemplating the Way Forward, last three paragraphs

"Complete knowledge of some recursive objects will always transcend our knowledge of them. The best we can do is to find a recursive process that will yield ever better approximations of them. The mathematical constant π is one such object. We can define π exactly as the ratio of the circumference to the diameter of a Euclidean circle, but can never reduce π to an algebraic expression. Wisdom is another such object. We can define Wisdom exactly as knowledge that allows a being to decide perfectly, but we can never reduce Wisdom to a logical expression.

"Many recursive processes will yield ever better approximations of π. We can use what we believe is the best of these processes to create a recursive program for producing ever better approximations of π. We may call the ever better approximates of π the *timeless end* of this program. The form of this end is a number. We may also call complete knowledge of π the *transcendental end* of this program. The form of this end is also a number.

"Similarly, many recursive processes will yield ever better approximations of Wisdom. We can use what we believe is the best of these processes to create a recursive program for producing ever better approximations of Wisdom. We may call the ever better approximates of Wisdom the *timeless end* of this program. The form of this end is a set of partial descriptions of the world. These descriptions ought to be as simple as possible, but not simpler; and the set of descriptions ought to be as small as possible, but not smaller.[2] We may also call complete knowledge of Wisdom the *transcendental end* of this program. The form of this end is the most useful form for a perfectly wise being in deciding well.[3]"

"[2] The inspiration for this belief about the timeless end of deciding well was Albert Einstein's theory of knowledge: "Physical concepts are free creations of the human mind, and are not, however it may seem, uniquely determined by the external world. In our endeavor to

understand reality we are somewhat like a man trying to understand the mechanism of a closed watch. He sees the face and the moving hands, even hears its ticking, but he has no way of opening the case. If he is ingenious he may form some picture of a mechanism which could be responsible for all the things he observes, but he may never be quite sure his picture is the only one which could explain his observations. He will never be able to compare his picture with the real mechanism and he cannot even imagine the possibility or the meaning of such a comparison. But he certainly believes that, as his knowledge increases, his picture of reality will become simpler and simpler and will explain a wider and wider range of his sensuous impressions. He may also believe in the existence of the ideal limit of knowledge and that it is approached by the human mind. He may call this ideal limit the objective truth (Einstein, Albert, *The Evolution of Physics: From Early Concepts to Relativity and Quanta*, New York: Simon and Schuster, 2008, p. 31).""

"[3] From the multiplex view, our need for simple models stems from our need to pursue Wisdom efficiently, not from the presumption that the Truth is knowable, or from the related reductionist precept that simpler models tend to be true."

were changed to:

"Complete knowledge of some recursive objects will always transcend our knowledge of them. The best we can do is to find a recursive process that will yield ever better approximations of them. The mathematical constant π, which is the ratio of the circumference to the diameter of a Euclidean circle, is one such object. Many recursive processes will yield ever better approximations of π. We can use what we believe is the best of these processes to create a recursive program for producing ever better approximations of π. We may call the ever better approximates of π the *timeless end* of this program. The form of this end is a number. We may also call complete knowledge of π the *transcendental end* of this program. The form of this end is also a number.

"Wisdom, which is the knowledge that allows a being to decide perfectly, is another transcendental recursive object. Many recursive processes will yield ever better approximations of Wisdom. We can use what we believe is the best of these processes to create a recursive program for producing ever better approximations of Wisdom. We may call the ever better approximates of Wisdom the *timeless end* of this program. The form of this end is a set of partial descriptions of the world. These descriptions ought to be as simple as possible, but not simpler; and the set of descriptions ought to be as small as possible, but not smaller.[2] We may also call complete knowledge of Wisdom the *transcendental end* of this program. The form of this end is the most useful form for a perfectly wise being in deciding well."

"[2] From the multiplex view, our need for economy in models stems from our need to pursue Wisdom efficiently, not from the precept that simpler models tend to be true. The proper supply-side precept holds that simpler models tend to be more useful in pursuing Wisdom, hence in pursuing the Truth. The inspiration for this belief about the need for economy in pursuing Wisdom was Albert Einstein's theory of knowledge: "Physical concepts are free creations of the human mind, and are not, however it may seem, uniquely determined by the

external world. In our endeavor to understand reality we are somewhat like a man trying to understand the mechanism of a closed watch. He sees the face and the moving hands, even hears its ticking, but he has no way of opening the case. If he is ingenious he may form some picture of a mechanism which could be responsible for all the things he observes, but he may never be quite sure his picture is the only one which could explain his observations. He will never be able to compare his picture with the real mechanism and he cannot even imagine the possibility or the meaning of such a comparison. But he certainly believes that, as his knowledge increases, his picture of reality will become simpler and simpler and will explain a wider and wider range of his sensuous impressions. He may also believe in the existence of the ideal limit of knowledge and that it is approached by the human mind. He may call this ideal limit the objective truth (Einstein, Albert, *The Evolution of Physics: From Early Concepts to Relativity and Quanta*, New York: Simon and Schuster, 2008, p. 31).""

Chapter 3, *Public Entropy*, second paragraph

Changed "with highly-trained, seasoned soldiers one person at a time" to "one at a time with highly trained and seasoned soldiers" in the sixth sentence.

Chapter 3, *Public Entropy*, second paragraph, footnote, last two sentences

"People working together perfectly act as if they were a single person deciding perfectly. Similarly, weakly interacting bosons (quantum-level objects with integer spin) at their lowest energy state act as if they were a single boson."

was changed to:

"People working together perfectly act as if they were a single person deciding perfectly, much as weakly interacting bosons at their lowest energy state act as if they were a single boson."

Chapter 4, *Recursivity*, last paragraph, footnote, last three sentences

"Arguably, this is because they see their role as helping people believe well rather than helping them to pursue Wisdom. We see this in the distinction between Thomas Kuhn's concept of a paradigm shift as a change in the way we conceive of the world and the popular concept of a paradigm shift as a change in the way we see the world that changes the world for the better. The people who shifted Kuhn's paradigm took a pragmatic view."

were changed to:

"Arguably, this is because they see their role as helping us to believe well rather than to decide well. Deciding well calls for considering ultimate ends, which in turn calls for confronting the limits of modern reason."

Chapter 8, Complete Reasoning, first paragraph, first sentence

"Models for pursuing timeless ends can never be both logically consistent and complete."

was changed to:

"The EOQ/RTS model showed the wisdom of using models for pursuing timeless ends to help us find problems to solve. These models can never be both logically consistent and complete."

Chapter 8, Complete Reasoning, first paragraph

Changed "this model" to "a model for pursuing a timeless end" in the new fifth sentence.

Changes in Version 2011.12.20

Acknowledgments, fourth paragraph

Changed "Ohno" to "Ohno and subsequent tour of Japanese factories practicing just-in-time manufacturing" in the last sentence.

Chapter 3, *Overcoming Constraints in Pursuing Wisdom*, second paragraph

Changed "computable in practice" to "in practice" in the second sentence.

Chapter 3, *Overcoming Constraints in Pursuing Wisdom*, last paragraph

Changed "calculating well" to "calculating" in the first sentence.

Chapter 3, *Decision-Oriented Interpretations of Quantum Mechanics*, last paragraph, footnote

Changed "subtracting" to "removing the members of" in the all (3 occurrences).

Changed "set of rational" to "set" in the fifth sentence.

Chapter 4, Refining Everyday Thinking, first paragraph

Changed "science" to "the whole of science" in the first sentence.

Chapter 4, *Self-Similarity*, first paragraph

Changed "uncertain predictions" to "uncertainty in prediction" and "incomplete explanations" to "incompleteness in explanation" in the second sentence.

Chapter 4, *Academic Fields*, first paragraph

Changed "the need" to "our need" in the last sentence.

Chapter 4, *Academic Fields*, second paragraph

Changed "the need" to "our need" in the first sentence.

Chapter 4, *A Crude Look at the Whole*, second paragraph

Changed "a debacle, the sudden release" to "debacles, sudden releases" in the third sentence.

Chapter 5, third paragraph

Changed "owe those who created the knowledge that we use freely" to "cannot pay to whom they are due" in the second sentence.

Chapter 6, A Common Timeless End, last paragraph

Changed "tools" back to "ideas" in the last sentence.

Chapter 7, *Boyd's Grand Strategy*, last paragraph, footnote

Changed "more about logical consistency and completeness" to "the boundlessly pragmatic solution to this dilemma" in the last sentence.

Chapter 8, Useful Reasoning, end

Inserted the following paragraph before the footnote.

"In deciding well using the multiple-frame approach to pursuing Wisdom, we seek to disprove the existence of an *a priori* approach to the whole of science by taking an *a priori* approach to the whole of science. In doing so, we transcend logic."

Changed the last two paragraphs of the footnote from:

"These students may find that quantum mechanics offers deeper insights into the problems of language than nineteenth-century atomic or biological models offer. For example, they may find decision-oriented interpretations of quantum mechanics to be useful in thinking through the problems of existence and consciousness, e.g., whether the means to land two people on the moon and bring them safely back to earth existed at 12 A.M. zero meridian time on January 1, 2000."

to:

"These students may find that quantum mechanics offers deeper insights into the problems of language than nineteenth-century atomic or biological models offer, especially concerning questions of existence, potential existence, and consciousness. When did the means to land people on the moon and bring them safely back to the earth first exist? Does it still exist? Why?"

Chapter 8, Complete Reasoning, first paragraph

"The EOQ/RTS model showed the wisdom of using models for pursuing timeless ends to help us find problems to solve. These models can never be both logically consistent and complete. Each contains the belief that we will never know the true meaning of its timeless end. If we find this meaning, the model is complete, but inconsistent. If we never find this meaning, the model is consistent, but incomplete. Further, to disprove that a model for pursuing a timeless end is complete, we need a more complete model. To disprove that this model is complete, we need a still more complete model. To disprove that this model is complete, we need a still more complete model. At the limit of this process of ever-increasing completeness are models of the problem that contains all other problems in pursuing Wisdom, which is the problem that multiple-frame models of pursuing Wisdom address.[4]"

"[4] Note that the multiple-frame approach to pursuing Wisdom is consistent with Gödel's belief in the existence of an *a priori* science, but not with the belief in the existence of an *a priori* science based on modern reasoning. Modern reasoning concerns the rules we use to bind beliefs together into coherent models of the world. The multiplex reasoning of deciding well concerns not only the rules we use to bind beliefs together into coherent models of the world, but also the rules we use to bind these models together into a coherent whole. Such reasoning is alien to modern science, but not to modern art. In the movie based on Carl Sagan's novel, *Contact*, the person who discovered the primer for the alien plans explained the key insight that led to this discovery: "An alien intelligence is going to be more advanced and that means efficiency functioning on multiple levels and in multiple dimensions." Such is the efficiency of zero public entropy."

was deleted.

Chapter 8, Complete Reasoning, new first paragraph, third sentence

"Our rules for settling these conflicts (prefer easy to accept and easy to use models), would have us choose the EOQ over the RTS model as a tool for describing how best to set up tools."

was deleted.

Chapter 8, Complete Reasoning, new first paragraph, new seventh sentence

"We prefer the RTS to the EOQ model as a tool for describing how best to set up tools."

was deleted.

Chapter 8, Natural Reasoning, last paragraph

"People who seek empirical evidence supporting one or the other of these views would do well to study power-law distributions in economies.[5] These distributions are the result of some self-similar process or processes. From the reductionist view of modern biology, it is not clear what this process or these processes might be. From the holistic view of this work, it is clear that this process is deciding well."

"[5] These power-law distributions include the distributions of wealth and income studied by Vilfredo Pareto and the distribution of changes in commodity prices studied by Benoît Mandelbrot."

was reduced to a footnote to the first paragraph:

"[5] People who seek empirical evidence supporting one or the other of these views would do well to study the power-law distributions of wealth and income studied by Vilfredo Pareto and the power-law distribution of changes in commodity prices studied by Benoît Mandelbrot. Power-law distributions are the result of some self-similar process or processes. From the reductionist view of modern biology, it is not clear what this process or these processes might be. From the holistic view of this work, it is clear that this process is deciding well."

Changes in Version 2011.12.22

Chapter 2, *Tools for Pursuing Pleasure and Joy*, last paragraph

Changed "to help us to know" to "to help us know" in the second to last sentence.

Chapter 3, Pursuing the Ring of Truth, second paragraph

Changed "timeless frame" to "skeletal frame" in the second sentence.

Chapter 6, *Heroic Death*, second paragraph, first footnote

"[11] From an Aristotelian view , too small a willingness to risk ourselves for the sake of others is cowardly, and too great a willingness to risk ourselves for others is foolhardy or self-destructive (*Nicomachean Ethics*, book 2, chapter 2). Only the wise amount is truly heroic."

was deleted.

Chapter 8, Natural Reasoning, first paragraph

Changed "both the supply and demand sides" to "the demand as well as the supply side" in the sixth sentence.

Changes in Version 2011.12.24

Acknowledgments, last paragraph

Changed "My great uncle, Wilfred James McNeil," to "Wilfred James McNeil" in the third sentence.

Changed "My business ethics professor, George Leland Bach," to "George Leland Bach" in the fourth sentence.

Changed "My father, John Huntington Harris," to "John Huntington Harris" in the fifth sentence.

Chapter 1, Choosing Frames Well, first paragraph

Changed "all removable ambiguity" to "all currently removable ambiguity" in the last sentence.

Chapter 3, Overcoming Constraints in Pursuing Wisdom, fourth paragraph

Changed "today" to "2012" in the first sentence.

Chapter 4, *Self-Similarity*, all three paragraphs

"We may think of science as the process of ridding ourselves of ever more ignorance about the world. This ignorance takes the form of uncertainty in prediction and incompleteness in explanation of causation. In pursuing the timeless end of believing well, we need to address both types of ignorance.

"We explain causation on lower levels of abstraction than the level we are trying to explain. When we choose a problem to solve, we choose to accept our current explanations of causation on the level of our chosen problem and on all higher levels. In effect, we choose to ignore our ignorance of causation on the level of our chosen problem and above. We embed this ignorance into our networks of knowledge in use.

"On the lowest level of abstraction, there exist no lower levels of abstraction from which to explain. From the modern view of the Copenhagen class of interpretations of quantum mechanics, quantum mechanics is the lowest level of abstraction that we can imagine. Searching for models that explain causation on the level of quantum mechanics at a lower level wastes resources. In contrast, from the multiplex view of the decision class, we ought to search lower levels for models that explain causation on the level of quantum mechanics

wisely. More than one explanation may fit what we can sense.[4] We ought to choose the explanation that best helps us pursue Wisdom."

were changed to:

"We may think of science as the process of ridding ourselves of ever more ignorance about the world. This ignorance includes not only uncertainty in prediction, but also incompleteness in explanation of causation.

"We explain causation on lower levels of abstraction than the level we are trying to explain. On the lowest level of abstraction, there exist no lower levels of abstraction from which to explain. From the modern view of the Copenhagen class of interpretations of quantum mechanics, quantum mechanics is the lowest level of abstraction that we can imagine. Searching for models that explain causation on the level of quantum mechanics at a lower level wastes resources. In contrast, from the multiplex view of the decision class, we ought to search lower levels for models that explain causation on the level of quantum mechanics *wisely*. More than one explanation may fit what we can sense.[4] We ought to choose the explanation that best helps us pursue Wisdom.

"*When we choose a problem to solve, we choose to accept our current explanations of causation on the level of our chosen problem and on all higher levels. In effect, we choose to ignore our ignorance of causation on the level of our chosen problem and above. We embed this ignorance into our networks of knowledge in use.*"

Chapter 4, A Crude Look at the Whole, second paragraph, last footnote, last sentence

"For more on power-law distributions in pursuing Wisdom, see the last chapter."

was changed to:

"As we shall see in the last chapter, the existence of power-law distributions in economies undermines Darwinian evolution as the general theory for explaining the evolution of life."

Chapter 8, Natural Reasoning, first paragraph, footnote

Changed "studied" to "discovered" in the first sentence (2 occurrences).

Changes in Version 2011.12.26

Chapter 1, Invariant Values, first paragraph, last sentence

"To choose other than these invariant values is to choose to blind ourselves to the full range of opportunities for learning by doing."

was changed to:

"Regardless of our current beliefs and circumstances, pursuing the Good calls for pursuing Wisdom, hence for pursuing the Truth, Justice, Beauty, and all of the other boundless factors of deciding well. To choose to pursue other than these values is to choose to blind ourselves to the full range of opportunities for learning by doing."

Chapter 5, Sovereignty, last paragraph, last sentence

"In scientific terms, the claims that secure sovereign rights are propositions to be tested."

was deleted.

Chapter 5, Sovereignty, last paragraph, footnote, last two sentences

"Governments, like people, are subject to virtuous and vicious cycles. Good governments tend to flourish; poor governments tend to fail."

were deleted.

Chapter 5, The Explicit Experiment, second paragraph

Changed "a scientific view" to "an eighteenth-century scientific view" in the last sentence

Chapter 5, *Lower Trade Barriers*, first paragraph, footnote

Changed "case for free trade" to "case for free trade, as the emergence of technology clusters attests" in the last sentence.

Changes in Version 2011.12.30

Chapter 2, Invariant Tools for Deciding Well, last paragraph, footnote

Changed "In this book, Cohen" to "Cohen" in the last sentence.

Chapter 2, Chicago Screwdrivers, entire subsection

Returned this subsection to the end of the Consumption section.

Chapter 3, *Overcoming Constraints in Pursuing Wisdom*, last paragraph

Changed "people who do not pursue Wisdom" to "other people" in the second sentence.

Changed "pursue Wisdom" to "pursue Wisdom using the multiple-frame approach" in the second sentence (2 occurrences).

Chapter 6, A Common Timeless End, last paragraph, end

Added the sentence:

"Current ignorance of the farther reaches of our nature prevents us from taking other than this brute force approach."

Chapter 6, A Common Timeless End, first paragraph, first sentence

"Adding this frame allows us to think more clearly about the relation between pursuing the Good and pursuing Wisdom."

was deleted.

Chapter 7, *A Normal Anomaly*, last paragraph

Changed "Game theory" to "Modern game theory" in the second sentence.

Chapter 7, *A Revolutionary Anomaly*, last paragraph, last sentence

"Only by addressing this universal problem can we remove the logs from our eyes."

was deleted.

Chapter 7, *Boyd's Grand Strategy*, last paragraph, footnote, last sentence

"For the boundlessly pragmatic solution to this dilemma, see the next chapter."

was deleted.

Chapter 7, *The Grandest Possible Strategy*, first paragraph

Changed "and" to "for embracing the endless turbulence pursuing Wisdom creates, and" in the last sentence.

Chapter 8, Natural Reasoning, first paragraph, footnote, end

Added the sentence:

"These distributions are the result of people deciding to act based on what they currently believe."

Appendix, Temporal Details, first paragraph, footnote

Changed "addresses" to "speeches" in the third sentence.

Changed "The author refreshed his memory with" to "Supplementary sources include" in the fourth sentence.

Changes in Version 2011.12.31

Preface, third paragraph, end

Added the sentence:

"In short, these boundless factors are aspects of *complete* knowledge of how best to pursue the timeless end of deciding well."

Chapter 4, *Recursivity*, last paragraph

Changed "In contrast, from" to "From" in the last sentence.

Changed "considering" to "us to consider" and "confronting" to "us to confront" in the last sentence of the footnote.

Added the following sentences to the end of the footnote:

"Models for pursuing timeless ends can never be both logically consistent and complete. Each contains the belief that we will never know the true meaning of its timeless end. If we find this meaning, the model is complete, but inconsistent. If we never find this meaning, the model is consistent, but incomplete."

Chapter 6, *Schweitzer's Universal Spiritual Need*, last paragraph, first two sentences

Changed "can help us refine our beliefs about justice" to "appears to confirm the justice of revering life well" in the first sentence.

Changed "He asks" to "This technique calls for" in the second sentence.

Chapter 7, *Boyd's Grand Strategy*, last paragraph, footnote

Changed "deciding well is" to "Boyd conceived deciding well as" in the last sentence.

Chapter 8, Useful Reasoning, third paragraph, third sentence

"We may call the set of rules that we use to relate these beliefs *the rules of logic* after the rules of reason Aristotle used to relate beliefs in his pursuit of natural forms."

was moved to the end of the paragraph and changed to:

"We may call the set of rules that we use to relate beliefs within these frames *the rules of logic* after the rules of reason Aristotle used to relate beliefs in his pursuit of natural forms."

Chapter 8, Useful Reasoning, fourth paragraph, third sentence

"We may call the set of rules that we use to judge the latter *the rules of dialectics* after the dialectic form of discourse that Socrates used to explain what these timeless ends are not."

was moved to the end of the paragraph and changed to:

"We may call the set of rules that we use to judge these frames *the rules of dialectics* after the dialectic form of discourse that Socrates used to explain what these timeless ends are not."

Chapter 8, Useful Knowledge, fifth paragraph

Changed "both the rules of dialects and the rules of logic" to "the rules of dialectics, the rules of logic, and the rules we use to relate these two sets of rules" in the last sentence.

Chapter 8, Useful Knowledge, last paragraph

"In deciding well using the multiple-frame approach to pursuing Wisdom, we seek to disprove the existence of an *a priori* approach to the whole of science by taking an *a priori* approach to the whole of science. In doing so, we transcend logic.[3]"

"[3] Students of Western thought may better understand the distinction between logic, dialectics, and Reason by studying Ludwig Wittgenstein's conversion from a picture theory of language based on a temporal view of the world to an instrumental theory of language based on the timeless end of living well. In his words, he came to believe that the goal of his later work in the philosophy of language was to "show the fly the way out of the fly-bottle." These students may find that quantum mechanics offers deeper insights into the problems of language than nineteenth-century atomic or biological models offer, especially concerning questions of existence, potential existence, and consciousness. When did the means to land people on the moon and bring them safely back to the earth first exist? Does it still exist? Why?"

was changed to the following footnote at the end of the preceding paragraph:

"[3] Students of Western thought may better understand the distinction between logic, dialectics, and Reason by studying Ludwig Wittgenstein's conversion from a picture theory of language based on a temporal view of the world to an instrumental theory of language

based on the timeless end of living well. In his words, he came to believe that the goal of his later work in the philosophy of language was to "show the fly the way out of the fly-bottle." These students may find that quantum mechanics offers deeper insights into the problems of language than nineteenth-century atomic or biological models offer, especially concerning questions of existence, potential existence, and consciousness."

Appendix, Less is More, first paragraph, footnote

Changed "dark energy and dark matter" to "dark matter" in the last sentence.
