

What is the most-generally-important scientific knowledge of all?

The Provably-Ultimate Scientific Framework is the Universe's Structurally-Fundamental Logical God Pattern that Biases Evolution for Whatever More-Effectively Tacitly-Uses God

**This features the provably-Universal Greatest Common Good
and its {corollary and provably-primary} methodical-science of
provably-unified Universal Logical-Ethical Realism. This means
the universe logically-embodies a {pervasive, objectively-subtle,
and fundamentally-normative} bias for progressive Renaissance.**

These {logically-primary but operationally-secondary} ethical-economic realities are very counterintuitive until they're known {logically, systematically, analytically, and reflexively}.

The Enlightenment Era developed {improved, positively-influential, yet logically-flawed} visions of the perfectly-naturally-lawful universally-supreme God of objective-ethics.

Science can now at last deduce aptly-logical corrections to those visions that provably-yields their objectively-ultimate realization (and thus vindication) as the {absolutely-fundamental and constitutively-logically-normative} characteristic quality of our universe's corollary {co-fundamental and constitutively-omnipresent} characteristic quality of (relationally-structurally) universal logical coherence.

Translation :-) Logic's remarkable ability to prove its semi-universal limitations (which are thus objectively-knowable features of reality, despite precluding omniscience) provably-reflects its {semi-infinitely-polymorphic yet transcendently-coherent} normativity. While this **universal logical-normative order** makes inferring Gods intuitively plausible, **its great cognitive-transparency** makes doing so **extremely error-prone**. This {high-leverage but underdeveloped} field is the **integral logical-ethical heart of all science**, and is thus the ultimate lever of progress.

Science can now prove (by reflexive inverse falsification and allied means) **the** categorically most-generally-important **universal-prime-directive theorem** of all possible {scientifically and religiously}-fundamental unifications (which involves logic's innate objectively-universal factual-normative-values). This theorem thus encompasses the universal senior scientific method **that** ({**despite, and due to**} our inevitably {**incomplete, imprecise, and flawed**} knowledge) **proves** that our wonderfully semi-infinitely {complex and resourceful} (albeit often harsh) universe {integrally, and thus implicitly}-provides the **best** {scientifically and religiously}-ultimately-fundamental cognitive-economic {virtue-criteria, and thus supreme ethical-evolutional policy-compass} **for realistically maximally-feasible** {mutually, collectively, and cumulatively} **good progress** — which dramatically-exceeds presently-stunted socio-techno-economic levels.

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Publication notes for this book

“Outside of a dog, a book is man's best friend. Inside of a dog it's too dark to read.”

—Groucho Marx

Thanks for reading!

- **We seek {patrons, grants, and consulting business} to support this work.**
- Although we often don't have spare time to correspond, feedback is still welcome. Conrad.Schneiker@Gmail.com. But please — no web marketing solicitations!!
- Please note! To avoid errors in this extremely error-prone field, we avoided innovation in the process of systematization. *So practically all of the good ideas in this work **each** have **multiple** sources in the works of **others**, often going back many decades or centuries.* Due to our limited resources (relative to the huge amount of extra work involved), we've generally abandoned hope of appropriately citing our overwhelmingly-numerous sources.

Editorial note about that “{...}” and “((...))” stuff

“Creative people must be stopped!”

—from a bumper sticker seen in Silicon Valley

It's often difficult to readily follow an idea involving a combination of conceptually-multidimensional factors when it's spread over multiple sentences (or paragraphs). This is one reason that works on philosophy are so often {mind-numbingly tedious, or else misleadingly oversimplified}. Unfortunately the challenges of mentally parsing long run-on sentences likewise tend to {needlessly overwhelm short-term memory, and thus thwart expedient comprehension}.

- So for {expressive economy and easier reading of non-trivial sentences}, we sometimes use “{...}” to visually delimit non-parenthetic {lists, multiple qualifiers, compound phrases, long phrases, or other items} — especially when these occur {in mid-sentence, or in combinations}. (This mirrors analogously-used vocal shifts in spoken speech.)
 - Our rationale for employing this format is explained in one of the appendices.
- We also employ “((...))” to visually delineate parenthetical sentences that might more-traditionally be relegated to footnotes. Footnotes don't work well for on-line reading, and they're still needlessly difficult to follow in printed form. This scheme makes it easy to skip over such items if you're not interested, while otherwise making it much easier to read them without the obnoxious disruption of jumping back and forth within the page.

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A One-Page Overview

Q: So, *What is the most generally-important scientific knowledge of all?* A: It's the provable-existence of the scientifically-universal logic of normative-values that we can know as a provably realistically-strong approximation — despite our inevitable residual {fallibility and ignorance}.

- This is an {ultimate and unified} logic of {objective and subjective} {value and fact}.
- Fortunately, knowing this requires only minimal novice-level knowledge of universal scientific logic — which this book provides an introduction to.
- The {huge and fragmented} field of logic is plagued with many vexing {paradoxes, controversies, and misconceptions}. Fortunately, the capability to recognize these problems implicitly provides the means for corralling their scope.
- We'll show how to {partly and yet decisively} resolve the few most important universal logical-ethical realism issues of all — despite the inevitable residual {imprecision, incompleteness, ignorance, and room for improvement} of such solutions.
- Irrationality can never generally be eliminated, due to logically-fundamental cognitive-economic factors. However, {irrationality and its worst consequences} can be moderated. The {easiest and most practical} way to collectively make people more effectively-logical is to make slight shifts in public perspectives of what logic is most-basically about. The cumulatively-compounding side-effects of slight tweaks can grow immensely.

Universal scientific logic is just a more-refined version of conventional logic that {explicitly and systematically} features the {scientifically primary and universally applicable} logical-value system that is {provably-implicit in, and thus derivable using} basic conventional logic.

Since *all scientific methods are applications of logic*, this primacy of logical-value has powerful {implications and applications} — despite logic's inevitable {limitations and complications}.

These results preempt many of the philosophical tar pits that have notoriously-retarded any systematic consolidation of a provably-primary logical-ethical framework of all scientific philosophy. These results circumvent "is-ought" problems that have thwarted {proving and applying} scientifically-supreme norms of {social ethics and economics}. Indeed, logic instrumentally-constitutes the universal greatest good, and serves as the scientific master-key for:

- determining the logically-ethically ultimate *universal prime directive* of all responsible realism,
- determining how to most-greatly-accelerate general {scientific and economic} progress, which can *dramatically-improve the overall global {standard and quality} of life*,
- determining {the logically-ethically *greatest common good of society* and corollary logically-ethically *scientifically-primary liberty-ownership rights*}, and
- peacefully cultivating the first {global, scientifically-inspired, and transcultural} *Renaissance* over the next several decades — despite the inevitable ongoing turmoil.

But don't worry! This still leaves our world with an endless supply of major problems. :-)

0. ** This Book is Under (Re)Construction. ******

This book is {an incomplete — but hopefully already practically-illuminating} work in progress.

- It variously involves {rewrites, revisions, corrections, and elaborations} of a number of predecessor mini-books).
- If you find this book interesting, please check back for new updates ever few months. The {title page footer date and the copyright page date} both reflect the last-revised date.

1. Preface

1.1 This work merely consists of systematically-consolidating some key {widely-scattered and often-overlooked} {discoveries and insights} of others.

Here are some examples (which are mostly heuristic for simplicity), expressed in quotations.

“The art of asking the right question ... is more important than the art of solving them.”

—Georg Cantor

“A problem well stated is half-solved.”

—John Dewey

“Logic is invincible because in order to combat logic it is necessary to use logic.”

—Pierre Boutroux

“... when we return from error, it is by knowledge we return.”

—Saint Augustine of Hippo

“The most pervasive fallacy of philosophic thinking goes back to neglect of context.”

—John Dewey

“Nature uses only the longest threads to weave her patterns, so that each small piece of her fabric reveals the organization of the entire tapestry.”

—Richard P. Feynman

“If we wish to understand the nature of the universe, we have an inner hidden advantage: we are ourselves little portions of the universe and so carry the answer within us.”

—Jacques Boivin

“The art of doing mathematics consists in finding that special case which contains all the germs of generality. ... I have tried to avoid long numerical computations, thereby following Riemann's postulate that proofs should be given through ideas and not voluminous computations.”

—David Hilbert

“The important things in the world appear as the invariants of transformations.”

—Paul Dirac

“The scientific method is only [an extension of] the market method.... Technology is the daughter of the market.”

—Terence Kealey

“Science is an economical summary of the world.”

—Salim Rashid

“Let us then exert ourselves to think well. This is the first principle of morality.”

—Blaise Pascal

“In opposition to the foolish ignorabimus ((the philosophical doctrine alleging our innate-inability to ever really {discover and know} ultimate things)) our slogan shall be: We must know — we will know!”

—David Hilbert

For a greatly expanded list of related quotes, please see this section:

- “12. Appendix — an Extended Thematic Constellation of Quotes about the Implications of the Provably-Supreme Science”.

1.2 How can there possibly be a provably-supreme science?

- That’s a good question.
- Another good question is: How could there possibly **not** be such a science in our universe — especially given the ongoing series of occasionally-spectacular scientific successes?

Since it will take a few chapters to adequately answer such questions

- (due to needing to overcome many prevailing misconceptions, and
- due to lacking an adequate conventional frame of reference),

we’ll first provide some useful background {context and reassurance} that the answers we seek are semi-inevitably readily-discoverable,

- given the world’s present level of {scientific and philosophical} expertise
- (so long as we cast a sufficiently wide net with respect to that expertise).

OK, so what’s the main strategic trick to pull this off? Although we have excessively-wide-ranging {scientific, historical, and philosophical} interests, our primary research interests have been focused (initially tacitly and intuitively, then increasingly explicitly) on the ultimately-fundamental scientific question of: **What is the most generally-important scientific knowledge of all?**

- This question {naturally and inevitably} leads to the ultimate nature of {universal logic, objective value, subjective value, and objective realism}.
 - This is the scientific realm where {epistemology, metaphysics, ethics, ontology, politics, and theology} all overlap.
 - This is the ultimate scientific common denominator of everything, including all scientific methods.
- Of course there are huge challenges in adequately addressing issues of the {fallibility, imprecision, and incompleteness} of our knowledge of the world (among other things).
 - We are especially interested in pursuing provably-good realistically-strong-approximations of key claims.

- The methodological doctrine of falsifiability that often (but not always) works fairly well in some branches of physics often naturally fails to yield the sort of enduring (versus provisional and speculative) logical-cognitive universality that so much of mathematics (the general science of patterns) has.
- Hence, the often-useful methodology of falsifiability (among other experimental-interpretative methods) has too often blinded investigators to the possibility of achieving stronger positive results for **some** parts of **some** fields that have the requisite logical-cognitive universality. This book is a quest to definitively determine the most generally-important such parts of such fields.
- We aim to show how the universe is innately (and thus necessarily or unconditionally) semi-infinitely more logically {coherent, sophisticated, and intelligible} than has been commonly supposed — despite its semi-infinite complexity.
 - This means that there are important realms of fundamental science where {enduring, certainly-strongly-true, and thus non-provisional} results are obtainable.
 - Such results are of course semi-infinitely-subject to further {refinement and extension} — but their strongly-constrained degree of possible {fallibility and imprecision} means they are not provisional in the conventional sense.
 - If this seems surprising, note that many esteemed concepts as {"provisional" and "fallible"} are related examples of enduringly-reasonably-valid concepts — despite their often being {over-generally-applied and otherwise misused}.
- The result of these investigations is a demonstrably most-realistic {integrally-unified and fundamentally-unitary} universal perspective (among all generic hypothetical possibilities), it is innately strongly anti-self-dogmatic.
 - This is an absolutely necessary consequence of making due contextual allowances for the {imprecision, incompleteness, and (fortunately constrainable) fallibility} of our {concepts and knowledge}.
 - One universal implication of this system is that all realistically-inferior competing systems {even fatally-flawed ones} must have some subsidiary redeeming features. Dogmatism tends to {retard or prevent} adequate due {recognition, salvaging, or selective emulation} of such features.
 - This is a consequence of the logically-multi-dimensional nature of {cognitive-criteria-values and their tradeoffs}.
 - For the most-realistic system to advance most rapidly, it needs at least a few strong (but preferably nondestructive and civil) contenders in order to:

- better see its own limitations for purposes of {taking due diligence cognizance of them, and incrementally reducing them where feasible},
- multiply the supply of creative partly-right {conceptions or improvements thereof} that it can {copy, correct, refine, and incorporate}.

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3. Main Introduction

“I’m not crazy about reality, but it’s still the only place to get a decent meal.”

—Groucho Marx

3.1 Some Major Challenges

Discussing logically-ultimately-fundamental issues pertaining to the ultimately-fundamental logical order of the universe involves some big challenges:

- Conventional {terms, usages, and perspectives} are not well-adapted for such purposes, and they often have a confusion-promoting multiplicity of meanings.
- For historical reasons, {academic and technical} jargon often tends to be {overly-obscure and counter-intuitively named}.
- Misconceptions (especially oversimplifications and overgeneralizations) about these issues abound.
- There are thus numerous {semantic, conceptual, and logical} {mazes and tar pits} that snare both {novices and experts}.
- The inevitable issues of {fallibility, ignorance, and imprecision} have to be adequately incorporated.
- It’s historically proven to be amazingly difficult to {intuit, find, discern, and formulate} the most generally ultimately realistic logical perspective prior to first more-or-less attaining it.

For all of these reasons, we will skip the common “bottom up” practice of {critiquing prior work and arguing for piecemeal improvements}, since that would be an extraordinarily {tedious and cognitively-inefficient} approach for our purposes here. (While we’ve greatly benefited from that routine academic practice, and we’ve also been greatly impeded by its routine overuse.)

- A few good photographs from space would have helped ancient people to much more easily overcome their many seemingly-plausible misconceptions about the earth’s place in the solar system. Conceptually-analogous approaches would likewise help us here.
- So we’ll begin with the largest possible perspective and its most logically-relevant interrelated patterns. Initially we just need to see what the overall 1,000 piece jigsaw puzzle picture looks like — the {complex and tedious} process of how the pieces were {selected, sorted, trimmed, and assembled} is irrelevant.
 - Once we have a good universal perspective in view, proofs that its major features are realistically correct will be {much more intuitively plausible and thus much easier to correctly comprehend}.
 - This shift in {perspective and context} will also make common logical-philosophical {misconceptions and tar pits} more readily apparent as such, and much easier to overcome.

- We will be glossing over a huge number of contentious technical issues. Our objective aims to provide a demonstrably-superior logically-universal {framework and perspective} for {addressing such issues and opening up newer ones} — by means of showing that the issues we focus on include the objectively highest priority issues of all.

3.2 A Little Historical Context

What we term “the greatest scientific revolution” emerged roughly between around 600 BC and 200 BC. This {very tenuous but very crucial} cultural revolution was the dawn of scientific logic as a {recognized and valued} {field and instrument} of investigation. It encompassed a multi-generation web of often-extraordinary ancient Greek geniuses, including {Thales, Anaximander, Xenophanes, Parmenides, Heraclitus, Anaxagoras, Empedocles, Democritus, Protagoras, Socrates, Plato, Aristotle, Diodorus Cronus, and Chrysippus}. There were other important intellectual contributors, including many who are now mostly lost to history. ((Ironically, the pro-scientific culture of cosmological-scope {logical analysis and conceptual refinement} they helped inaugurate makes their many blunders of {under-qualification and over-generalization} readily apparent to us. We should not let this blind us to their pioneering contributions.)) This remarkable network was clustered around the leading {commercial, cultural, and intellectual} crossroads of their world. The greatest scientific revolution involved the increasing {tacit and explicit} recognition that the world is *somehow* ultimately logically structured — which meant that increasingly-realistic thinking {tacitly must, and thus more-explicitly should} somehow reflect this primal pattern.

- However, figuring out what that “*somehow*” most realistically means has been a {hugely contentious and largely unsettled} dispute for all subsequent generations of scientifically-oriented thinkers. It’s easy for outsiders to fall prey to grossly oversimplified views of this enormously challenging issue. While the ultimate resolution of this issue must have a fairly simple core, this core is situated in a complex web that makes finding it analogous to finding the right combination to a safe with many millions of possible settings on a multi-stage combination lock. We claim that the solution has been multiply discovered in dispersed piecemeal form — but this remarkable achievement has been largely hidden by the spectacular 20th century academic information {explosion and fragmentation}.
 - This book is about the demonstrably-categorically-best interim resolution of that perplexing issue of ultimate logical realism — “best interim” meaning that this resolution {innately and thus strongly} approximates the inevitable semi-infinite series of progressively-superior resolutions that can be discovered.
 - While this possibility may seem surprising, it’s actually the {inescapable and implicit} rational basis for many everyday objectively-correct suppositions, such as:
 - “We shall always be fairly fallible.”
 - “Our knowledge of the universe will always be essentially incomplete.”

- “There are always many future possibilities that {surprise and surpass} our always semi-ignorant imagination.”
- The {commonly-called and justly-celebrated} “scientific revolution” was a realistically-superior application of “the greatest scientific revolution” to {already-ongoing and commonly commerce-related} technological experimentation — which was likewise greatly helped by {already-ongoing and commonly commerce-related} improvements in measuring instrumentation. The wide-ranging {investigations and disputations} of medieval academics also cultivated greatly-expanded discernment of {conceptual and analytical} logical {resources and bugs} in the cultural cognitive software of early natural science philosophy. This too was another logically-important catalyst of the scientific revolution.
 - Unfortunately {the devastating great plagues, the terrible cultural wars of the reformation and counter-reformation, and many other challenges} slowed down the big positive drivers of the scientific revolution.
 - Likewise, the scientific revolution might have happened much earlier if {the late-medieval printing presses and mechanized paper production} had been developed centuries earlier. These great multiple-invention-clusters produced {spectacular and revolutionary} economic cost reductions for information transfer — whose magnitude is crudely analogous to late 20th century multiple-invention-clusters of {personal computers, desktop printers, and the World Wide Web} — which in turn {made our investigation of post-knowledge-explosion logical knowledge possible, and made this book’s production feasible}.

3.3 Some Key Ideas of the Logically-Holistic Worldview

“The whole of science is nothing more than a refinement of everyday thinking.”

—Albert Einstein

Since {“science” and “logic”} are used to designate a great variety of {perspectives, contexts, doctrines, and systems}, we will informally {qualify and designate} our {scientific and logical} perspectives as follows:

- “Universal science” — labels the view that all actually-possible subjects are ultimately within the scope of potential scientific {investigation and comprehension}.
 - This doesn’t preclude other {generally useful or even generally preferred} approaches to many subjects of interest — this simply means {that such subjects cannot be truly precluded from the realm of science, and that other approaches cannot be truly contrary to correctly understood science}.
 - Of course the generally most appropriate scientific approaches to many subjects of interest can be quite challenging to discover — but alternative approaches typically face this same challenge as well.

- “Scientifically-universal logic” (aka “universal scientific logic”) — labels the view {that the universe is ultimately logical, and that the ultimate logic of the universe is scientifically-universal}.

3.3.1 The integrally-interrelated primacy of {logic, value, universe, and existence} — the ultimately-fundamental logically-universal frame of reference is the logically-coherent self-cognizable universe of existence.

This brings us to the ultimately-fundamental fact of logically-universal scientific realism:

- Logic (in the sense of “universal scientific logic” and “scientifically-universal logic”) is the most {general, fundamental, primal, and integral} {structural and relational} characteristic of all (aka universal) existence.
 - In the most {fundamental and comprehensive} senses, the concepts {“existence” (of the logical universe), “logical” (structure of universal existence), and “universe” (of logical existence)} are all integrally-interrelated aspects of the same ultimately-fundamental reality.
 - “To be” means to be a feature of the innately logically-interrelated universe of existence.

3.4 The everyday basis of universal scientific realism

Our pursuit of this logically-richer system of scientific realism begins by delving into the commonly-overlooked roots of the conventional logic of everyday {language and meaning}.

- While logic is a useful tool for making deductions, the use of that capability can be reflectively turned upon itself to prove that logic’s power derives from scientifically-ultimate universal characteristics of reality pertaining to values. This {simple yet fundamentally important} advance provides a more logically-unified map of reality.
- Of course there’s no getting away from the inevitable issues of {imprecision, incompleteness, and many other challenges}. However, we can still use this improved map to more-powerfully-extend the deductive-reach of logic in some {vitaly-important yet poorly-developed} scientific realms, such as {normative economics and social ethics}.

This resulting system overlaps many contending {doctrines of scientific method and branches of philosophy}. We call this system “logical-ethical universalism”.

- The name “logical-ethical universalism” emphasizes the preexisting unification of {logic and value} as the {essential, universal, and supremely important} characteristic basis of all genuine realism.
- Logical-ethical universalism is the {most-fundamental and most-universal} science of all. It {selectively unifies and systematically reformulates} the many partial-truths of these major contending realms:

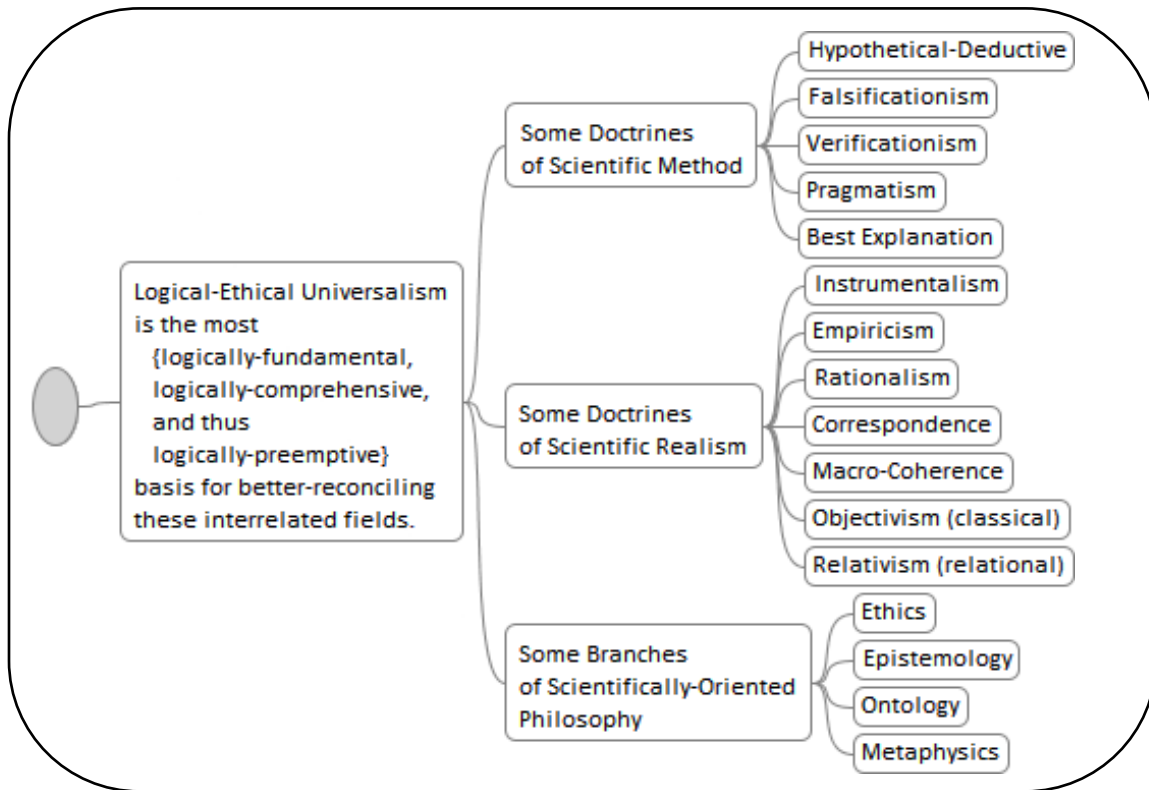


Figure 1 — Map of scientifically-oriented doctrines relating to logical-ethical universalism.

3.5 Avoiding logically-subsidary “tar pit dichotomies”

For our purposes here, {identifying, clarifying, and demonstrating} the most {generally important and scientifically fundamental} necessary truths of logic takes logical priority over delving into subsidiary issues of contentious philosophical analysis. We aim to show that simple improvements in our comprehension of basic logic have some {limited but powerful} scientific applications — despite many {related and unresolved} philosophical issues.

In this context, scientifically-oriented philosophy of logic has long been bedeviled by preoccupation with seemingly-plausible “tar pit dichotomies” involving {commonly-supposed dichotomies of mutually-exclusive categories}. We will avoid them. Some common examples of logically {secondary, skewed, flawed, or false} dichotomies include:

- facts versus values,
- necessary truths versus factual truths,
- rationalism versus empiricism,
- a-priori truths versus a-posteriori truths, and
- analytic truths versus synthetic truths.

Since our present aim is presenting a logically-superior map of the universe of science, we won't detour into critiques of such purported dichotomies. We're just explaining why these familiar sorts of things were deliberately omitted — for our purposes, they are inferior schemes that have outlived their historically-important exploratory utility. Logical-ethical universalism now aims to more-aptly {bypass or transcend} them.

3.6 The universal value map of logical-ethical universalism

Here's a map of the value terminology that we'll be using to:

- better-overcome past confusions involving {value roles, value scopes, and value orientations},
- {explain and demonstrate} the {thoroughly value-infested nature of logic, and the thoroughly logic-infested nature of value}, and
- explain how to scientifically leverage these {simple but powerful} logically-valuable insights.

Value Orientations		Value Roles	
	objective, subjective	instrumental (means)	preferential (aims)
Value Scopes	universally applicable	Invariant universal objective norms (= logic, the universe's primary pattern of effective realism, which partly-constitutes meaningful-intelligibility.)	Invariant universal objective preferences (= the {tacit, systemic, and constitutive} objective logical preference for subjective effectiveness.)
	person specific	Variable person-specific {objective and subjective} norms (Our beliefs commonly combine {instrumental and preferential} value roles.)	Variable person-specific subjective preferences (These preferences also include all of our {thinking and believing}, which are preferences of cognitive self-orienting.)

Figure 2 — Map of {value roles, value roles, and value orientations}.

3.7 Objectives

The great humane challenge for science is bringing our {swarms of subjective preferences} into {more practical and more satisfying} mutual harmony with the {universal, objective, and instrumental} norms of logic. And preferably to do so by discovering means that are moderately {easy, gradual, and pleasant} — which approximately amounts to discovering {moderately-commonly naturally-incentivized} cognitively-economic means.

So this brings us to our next topic of turning logic back on itself to deduce some of its commonly overlooked value-centric roots.

4. The Implicit Universal Values of Conventional Logic

Scientifically-universal logic entails the neighborly attitudes of “live and let live” and “peaceful coexistence” (plus a generally entrepreneurial-creative outlook), so you needn’t worry about “culturally oppressive scientific hegemony”. The ultimate ethics of logic is the most powerful basis of {local and global} defenses against widely-prevalent less-neighborly attitudes.

4.1 Towards the universal ethical values of logic

This overview of the universal ethical values of logic will spare you the technical details (which can be found in the references given at the end of this article).

What’s the ultimate context of logic for purposes of reforming conventional logic?

Science fundamentally constitutes an objectively universal value system. These conditions of {fundamentality, objectivity, and universality} are very powerful constraints of this system. As such, this system cannot be logically derivative of anything else, so the primary science of scientifically-universal logic must explicitly incorporate logically-fundamental values. The rule that “you should be reasonably logical” is a rule of logic (versus something external to it) — to deny this is to deny the unconditional objective primacy of logic. Even when in error, all attempted realistically-meaningful thought inescapably presupposes the objectively universal instrumental value of logic.

4.2 Back to basics — the logically-fundamental axioms of scientific logic

The logically-fundamental universal laws are the axioms of logic. (Don’t confuse this case with mathematical conventions, where the {status and role} of axioms often significantly differs.)

The logically-fundamental universal scientific axioms are logically-irreducible conceptual truths that are innately logically-irrefutable invariants, which thus cannot be denied without generating contradictions. This is the key to proving their status. These logically-fundamental axioms are mutually-interdependent, so beware of bogus attempts to reduce away axiom interdependencies. These logically-fundamental axioms are mutually-fundamental, so beware of falsely-inverted fundamentalism, which wrongly regards some axioms as more fundamental than others because of {relative generality, order of recognition, or other incidental factors}.

The logically-ultimate axioms of science are logically prior to many beguiling categorical false dichotomies of falsely-inverted fundamentalism — such as “empirical versus rational”, “analytic versus synthetic”, “a priori versus a posteriori”, “fact versus value”, “science versus religion”, “mental versus physical”, “mind versus body”, and so on. Beware of these insidious tar pits.

We already have to be thinking semi-logically to think at all. We can use increasingly-sophisticated webs of thought-experiments to {empirically and systematically} converge on demonstrably-ultimate axiomatic truths. Conventional scientific experiments amount to instrumentally-augmented thought experiments (which are hugely-advantageous, when {feasible and collectively decisive}).

We don’t need conceptual perfection for attaining great realistic certainty. We know for sure that we are fallible, and that we are not omniscient. We can do much more along such lines. We’ll

pursue systematic means of {corralling, constraining, or otherwise circumventing} inevitable residual {imprecision, uncertainty, inconsistency, and error} for some special patterns of knowledge. We'll see that the universally-scientific logical realm of practically-important great realistic certainty is vastly larger than conventionally supposed (despite still being a fraction of our overall knowledge).

4.3 How to find logically-invariant universal axioms

“I have tried to avoid long numerical computations, thereby following Riemann's postulate that proofs should be given through ideas and not voluminous computations.”

—David Hilbert

For brevity, we'll simply assume the classical logical axiom of noncontradiction, which (very roughly) states that something cannot simultaneously be true and false, at the same time, in the same place, and in the same respect. Recall Aristotle's warning that this axiom needs to be carefully amended by whatever additional qualifications are later found necessary for avoiding contradiction. This principle of careful as-needed refinement applies to all axioms.

The logically-fundamental axioms of logic constitute logically-invariant patterns of all realistically-meaningful thought. (However, that doesn't mean we can deduce everything from axioms, nor reduce everything to them.) How do we find these axioms in the first place? By means of logical invariance-seeking thought experiments that exploit axiomatic undeniability.

We'll use the ancient {Socratic, Platonic, and Aristotelian} method of experimenting with reflexive statements, meaning statements that are {directly or indirectly} {self-referring or self-applicable}. Our objective is to produce self-reflective statements involving purported axioms that cannot be denied without generating performative contradictions, thereby demonstrating axiomatic identity. (We're concentrating on performative contradictions here, because they're especially useful for value-related issues. Other sorts of contradictions may be pursued in other cases.)

Considerable {care and skill} is required to get reliable results from this scientific method. It almost-inevitably eventually trips up the great thinkers that use it. The various subtle conceptual flaws that are implicit in our {culturally-inherited and haphazardly-evolved} language pose some major challenges, among others things. This doesn't mean that {language or our minds} are logically inadequate, but rather that the enormous power of our half-domesticated language easily gets out of hand, and readily leads us unwittingly astray. This is why {much trial-and-error by many minds} is needed.

Since there aren't any other scientifically realistic methods for pursuing this task, we just have to persist as best we can, until success is finally achieved. Fortunately, we have some 25 centuries of trial and error to learn from. (That's hugely helpful.) Plus we can judiciously employ multiple cross-checks, exploit interdependent axioms, and do comprehensive system building. (Prior work is hugely helpful here as well.) Once sufficient success is attained, we can go back and find a much simpler short cut to use — which is our next topic.

5. Universalist Logic

5.1 The scientifically-supreme universal logic axioms

((To be completed.))

5.2 The universal logic axiom of ultimate scientific value

We're now ready to logically-integrate the often-noted essential value system character of science and logic, which involves the supreme value of objective scientific realism. The “ultimate-scientific-value axiom” (USV-axiom) of logic states that the axioms of logic constitute the universally-objective instrumental value system of all realistically-meaningful thinking. (This value doesn't preclude employing creative imagination or enjoying fiction — we just shouldn't misconstrue such things.)

If we deny that the USV-axiom is true, we inescapably generate a performative contradiction. How so? Since the noncontradiction axiom is the basis of all realistically-meaningful distinctions between agreement and denial, we implicitly treated the noncontradiction axiom as an ultimate instrumental value in the course of denying the instrumental value role of axioms in general. Since the noncontradiction axiom further requires that realistically-meaningful thinking must avoid contradicting the other irrefutably-true axioms as well, they all share the same instrumental value status.

The key idea is that realistically-meaningful thinking {requires and means} that we {implicitly or explicitly} use the logical axioms as ultimate objective instrumental values — even when trying reject them. Since these axioms are logically-fundamental for all realistically-meaningful conceptual thinking, they have objectively ultimate instrumental value priority for conceptually comprehending everything (including themselves).

The ultimate-scientific-value axiom (USV-axiom) fundamentally precludes the bogus fact-value dichotomy (which we'll suitably recast later). We'll commence with a whirlwind tour that briefly highlights some other important implications of the USV-axiom for universally-scientific logic.

5.3 The performative preference axiom

Another extremely important value axiom concerns subjective values. The performative-preference axiom states that our net personal (subjective) preferences regarding anticipated outcomes of consciously-recognized alternative courses of action are performatively demonstrated by our subsequent action (or inaction). Like the USV-axiom, this axiom cannot be denied without generating performative contradictions.

The performative preference axiom is surprisingly powerful, because it provides the logical basis for deriving generally-applicable personal-value {trade-off and exchange} theorems of economics that are personal-value-invariant. (This is analogous to the use of dynamical invariance symmetries in physics.) This makes axiomatically-scientific economics possible, which is a scientifically-superior tool for economic analysis.

If we consider how the preceding two value axioms of logic apply to {each other, ourselves, and other people}, we can see that universal objective values are a special case of personal subjective values that are person-invariant. We'll elaborate a bit more on value-invariance classes later. Meanwhile, we should avoid the common folly of misconstruing the important subjective-objective distinction as the bogus subjective-objective dichotomy.

((Under revision/expansion.))

6. Logical-Ethical Universalism

((Under revision/expansion.))

7. The Major Realms of Logical-Ethical Universalism

((Under revision/expansion.))

8. Conclusion

If learning about scientifically-universal logic doesn't leave you more {intrigued, delighted, and hopeful}, then you're missing the big picture, and you should take another look. In any case, you should learn more about whatever aspects of scientifically-universal logic interest you, and you should (when personally appropriate) diplomatically encourage others to do the same.

Scientifically-universal logic is primarily concerned with priorities, relevance, and reality-checks. It should be pursued in a lively and engaging manner. Treat it as the universe's greatest scientific playground (but not to the exclusion of other playgrounds). And also consider what you can most easily do to help promote the advancement of scientifically-universal logic.

Be sure to take some time out every once and a while to contemplate just how logically-awesome our logically value-oriented universe really is.

And make the most of it.

“Trials never end, of course ... but there is a feeling now, that was not here before, and is not just on the surface of things, but penetrates all the way through: we've won it. It's going to get better now. You can sort of tell these things.”

—Robert Pirsig

9. Appendix — Synopsis

While our everyday (natural language) logic of meaning is {incompletely and imperfectly} known, it's still powerful enough to demonstrate that many meaningful skeptical challenges {inescapably, implicitly, and realistically} presume logic. Such inverse-falsification methods can thus prove logic's innate conceptual {validity and universality} — despite known logic's {inevitable, but now powerfully-delimited} residual {imprecision and incompleteness}.

This proof further entails that logic constitutes the scientifically-fundamental core basis of objectively-normative {ethics and economics}. This means that logic constitutes the supreme science of all realism (and that logic is not merely a coincidentally pragmatic inference system), and that fully-scientific logic (universal value logic) is innately {ethical and cognitive-economic}. This core science thus transcends the status merely-provisional knowledge. So while this powerfully-expanded logical science is inevitably subject to extensive refinement, it's innately immune to radical revision (because it's a fundamental basis of such meaningful distinctions).

While this supreme core science is logically-ethically fundamentalist in terms of the universally-ultimate criteria of realism, this also inherently-precludes universal {reducibility or deducibility}. However, since this system contains the logically-ultimate basis of scientifically-fundamental {ethics and economics}, the ultimately most-important objectively-normative principles of these fields are deducible as theorems — despite the semi-infinite realm of further knowledge in these realms that can only be learned {experientially, experimentally, or evolutionally}.

Fortunately, science can decisively identify the universal greatest good, despite many subsidiary limitations. This has great cultural value for {partly, fairly, and objectively} {adjudicating and reconciling} many contending doctrines of {science, religion, and social ethics}. This also provides a {limited but extremely-important} provably-objective basis of scientific self-ownership liberty-rights, plus corollary provably-superior economic norms to maximize the {practical realization and mutual benefits} of these objectively ethically-supreme scientific rights.

These developments portend eventually-spectacular advances in {scientific, cultural, technical, and economic} realms — perhaps as early as the mid-21st century. In any case (barring civilization-crashing mega-disasters), the results will eventually be dramatically improved worldwide {standards of living and quality of life} for everyone. This would put us securely on the long-term path to a scientifically-blessed galaxy-class civilization.

10. Appendix — Technical Abstract

Just as we can effectively use logic to learn that our knowledge of logic is inevitably {incomplete, imprecise, and somewhat flawed}, so we can likewise use logic to learn what ultimately makes logic realistically powerful enough to recognize such circumstances, despite such circumstances. The wonderful power of logic to diagnose the {limits, errors, and fallibility} of our knowledge is also the power to {realistically and demonstrably} know the scientifically {fundamental and universal} basis of all knowledge — albeit in terms of {incomplete yet very strong} conceptual approximations.

The most important result of such investigations into the ultimate conceptual framework of logic is that {logic, ethics, and economics} are interrelated characteristics of the same {scientifically-fundamental and integrally-universal} system. This makes it possible for science to definitively (albeit partially) treat many {normative and prescriptive} issues of enormous practical importance — especially pertaining to {anti-skepticism, social ethics, and socioeconomics}.

How is this inherently possible? Both {our universe and realistic thinking} are partly-but-essentially constituted by the same ultimately-fundamental system of logical-structural relations. So we can inherently use logic to determine many key factors of the ultimate logical structure of reality. We can use logic in self-reflective performative contexts to establish logic as the supreme scientific system, and thereby show how reality is innately {progressively-intelligible, value-biased, and meaningful}. Logic thus provably implicitly-constitutes the {ultimately-fundamental, universally-objective, and self-reflectively-invariant} systematic factual-norms of {cognitive economics, scientific methods, and responsible scientific realism}.

11. Appendix — About the “{...}” Format

“By relieving the brain of all unnecessary work, a good notation sets it free to concentrate on more advanced problems, and in effect increase the mental power of the race.”

—Alfred North Whitehead

One of the greatest challenges in {discovering and explaining} logical-ethical universalism is that present-day vocabulary conventions aren't yet well-adapted for this role. So our challenge is how to most {expediently and economically} tap the great expressive power of language, despite using conceptions that {are often crude approximations and are often somewhat misleading} for our purposes.

- When describing {tricky, multi-sided, or misunderstanding-prone} subjects, we find this format is often much easier to comprehend than trying to follow (or write) equivalent descriptions that would otherwise often run on for {one or more} paragraphs. In other words, this format {beneficially economizes cognitive resources, while making them more productive} — at least for us.
- This format helps to prevent inadvertent {over-simplification and over-generalization} due to the flexible ambiguities of language.
- We are also trying to describe things for a very diverse audience in terms of {educational backgrounds, levels of expertise, and technical interests}.

There is a long history of textual format innovation.

- Such innovations include {word spacing, capitalization, periods, commas, all other forms of punctuation, and place-value number formats}. The cognitive utility of these innovations is now generally taken for granted.
- We {copied and adapted} this format from set-theoretical mathematics, where it has proven its expressive value over many decades — including within accompanying descriptive text.

This format more faithfully reflects {how we think about our richly multiplex universe, and how we think about our very imperfect knowledge of it}.

- We found this format very useful for {better note-taking about, better comprehension of, and better consolidation of} of the {generally-interrelated but widely-scattered} knowledge that we've acquired.
- So we hope this format will help others to more-readily out-think us for purposes of most-productively {correcting, refining, expanding, and applying} this formulation of logical-ethical universalism.

We apologize if you don't like this experimental format. But for our purposes, it's the best tradeoff that we could think of. So please give it a fair test drive until the strangeness wears off.

12. Appendix — an Extended Thematic Constellation of Quotes about the Implications of the Provably-Supreme Science

12.1 Notable Quotations about Key Scientific {Insights and Perspectives}

This section {includes and extensively supplements} the brief collection of quotes in the Preface.

The following constellation of quotes aims to {informally, roughly, but elegantly} triangulate the multiplex perspective of universal logical-ethical realism. More specifically, we aim to demonstrate that the key scientific {insights and perspectives} in this section’s quotes

- can be mutually {suitably-qualified, refined, reconciled, and systematized}
- to formulate a demonstrably {highly-realistic and thus realistically-great} {scientifically-universal and thus logically-ethically unified} cosmic perspective,
- as measured by its medium-to-long-term ability to dramatically multiply the world’s current level of overall socio-techno-economic {power, progress, and human well-being}.

Some additional notes concerning {these quotes and their authors}:

- In many cases, other authors have expressed similar sentiments (often independently); however our focus here is on content, so we used items we’re most familiar with.
- To help condense this list, some authors’ related quotes are spliced together with “...”.
- Our wonderful web era has made it much easier to find/retrieve quotes, but it’s also given rise to a plague of misattributed quotes. Hopefully no mistakes have slipped through.
- We reject the less-enlightened views that many of these authors unfortunately {held or mindlessly expressed}, which are sometimes evident in their {once-conventional but scientifically-unwise} historical-linguistic sexism (among other sorts of cognitively-retarded “-isms”).

12.1.1 A preliminary {informal, intuitive, and conceptual} context for universal logical-ethical realism, expressed in terms of relevant quotations.

“The art of asking the right question ... is more important than the art of solving them.”

—Georg Cantor

“A problem well stated is half-solved.”

—John Dewey

“Logic is invincible because in order to combat logic it is necessary to use logic.”

—Pierre Boutroux

“The most remarkable discovery ever made by scientists, was science itself.”

—Jacob Bronowski

“The great barrier to progress is not ignorance, but the illusion of knowledge.”

—Daniel J. Boorstin

“If you read only modern works, you’ll commit ancient errors.”

—Karl Keating

“... when we return from error, it is by knowledge we return.”

—Saint Augustine of Hippo

“The most pervasive fallacy of philosophic thinking goes back to neglect of context.”

—John Dewey

“Look always at the whole.”

—Marcus Aurelius

“The whole is more than the sum of the parts.”

—Aristotle

“Nature uses only the longest threads to weave her patterns, so that each small piece of her fabric reveals the organization of the entire tapestry.”

—Richard P. Feynman

“If we wish to understand the nature of the universe, we have an inner hidden advantage: we are ourselves little portions of the universe and so carry the answer within us.”

—Jacques Boivin

“The art of doing mathematics consists in finding that special case which contains all the germs of generality. ... I have tried to avoid long numerical computations, thereby following Riemann's postulate that proofs should be given through ideas and not voluminous computations.”

—David Hilbert

“We seek to decode nature’s gigantic cryptogram in such a way that structures emerge which are conserved under various changes and metamorphoses.”

—Gottfried Leibniz

“The important things in the world appear as the invariants of transformations.”

—Paul Dirac

“Order is heaven’s first law.”

—Alexander Pope

“Uncertain knowledge + knowledge of the amount of uncertainty in it = usable knowledge.”

—C. Radhakrishna Rao

"The whole of science is nothing more than a refinement of everyday thinking."

—Albert Einstein

"The scientific method is only [an extension of] the market method.... Technology is the daughter of the market."

—Terence Kealey

"Science is an economical summary of the world."

—Salim Rashid

"In conceptual analysis, as in brain surgery, the work that can be done is delimited by the refinement of our tools."

—Donald W. Mertz

"It is through science that we prove, but through intuition that we discover."

—Henri Poincare

"You can only find truth with logic if you have already found truth without it."

—Gilbert Keith Chesterton

"Logic is the hygiene the mathematician practices to keep his ideas healthy and strong."

—Hermann Klaus Hugo Weyl

"The real danger is not that computers will begin to think like men, but that men will begin to think like computers."

—Sydney J. Harris

"Mathematical Logic has completely deformed the thinking of mathematicians and philosophers."

—Ludwig Wittgenstein

"Careful attention to one thing often proves superior to genius."

—Cicero

"The ability to focus attention on important things is a defining characteristic of intelligence."

—Robert J. Shiller

"The test of a first-rate intelligence is the ability to hold two opposed ideas in mind at the same time and still retain the ability to function. One should, for example, be able to see that things are hopeless and yet be determined to make them otherwise."

—F. Scott Fitzgerald

"The voyage of discovery lies not in seeking new horizons, but in seeing with new eyes."

—Marcel Proust

"The task is not to see what has never been seen before, but to think what has never been thought before about what you see every day."

—Erwin Schrodinger

“As for hailing [the new term] scientist as ‘good’, that was mere politeness: [Michael] Faraday never used the word, describing himself as a natural philosopher to the end of his career.”

— Sydney Ross

“[Messier], less economical reasoning ... can lead to greater insight, in the manner that statistical mechanics can offer more insight than thermodynamics. The longer road, Bell reminded us, may lead to more familiarity with the country.”

—Harvey P. Brown

“If my history lesson has done nothing else, it should have reminded you that, during any given period in the evolving history of physics, the prevailing, main line, climate of opinion was likely as not to be wrong, as seen in the light of later developments. ... I also have a secret fear that new generations may not necessarily have the opportunity to become familiar with dissident ideas.”

—Julian Schwinger

“But mechanism is not law. It may explain what has happened but not why it should happen. ... [We] see that the search for mechanism has been monumentally unproductive for the understanding of design in nature. ... [In this respect, the] fundamental division between physics and biology is false. ... Everything that moves is a flow system that evolves over time [when free to do so]; design generation and evolution are universal phenomena. ... This [central unintentional tendency and implicit purpose] of nature is the direction of evolution [towards approximately more optimally-hierarchically-distributed imperfections]...”

—Adrian Bejan

“At the heart of science is an essential balance between two seemingly contradictory attitudes — an openness to new ideas, no matter how bizarre or counterintuitive they may be, and the most ruthless skeptical scrutiny of all ideas, old and new. This is how deep truths are winnowed from deep nonsense.”

—Carl Sagan

“We don’t know a millionth of one percent about anything.”

—Thomas Alva Edison

“A teacher affects eternity; he can never tell where his influence stops.”

—Henry Adams (1838–xxxx)

“Civilization is a movement and not a condition, a voyage and not a harbor.”

— Arnold J. Toynbee

“Every thoughtful person who hopes for the creation of a contemporary culture knows that this hinges on one central problem: to find a coherent relationship between science and the humanities.”

—Jacob Bronowski

“We can speak to each other only because we can appeal to something common to all of us, namely, the logical structure of reason. ... Metaphysics and theology are not, as the positivists pretend, products of an activity unworthy of Homo Sapiens, remnants of mankind’s primitive age that civilized people ought to discard. They are a manifestation of man’s unappeasable craving for knowledge.”

—Ludwig von Mises

“Empty are the words of the philosopher who does not heal the suffering of man.”

—Epicurus

“Integrity without knowledge is weak and useless, and knowledge without integrity is dangerous and dreadful.”

—Samuel Johnson

“A danger sign of the lapse from true skepticism in to dogmatism is an inability to respect those who disagree.”

—Leonard George

“What you do not want done to yourself, do not do to others.”

—Confucius

“All that we are is the result of what we have thought.”

—Buddha

“To preach morality is easy, to give it a foundation is hard.”

—Arthur Schopenhauer

“Without the virtue of fortitude, other virtues cannot exist except by accident. ... The principal act of courage is to endure and withstand dangers doggedly rather than to attack them.”

—Saint Thomas Aquinas

“For a long time it has been known that the first systems of representations with which men have pictured to themselves the world and themselves were of religious origin. There is no religion that is not a cosmology at the same time that it is a speculation upon divine things. If philosophy and the sciences were born of religion, it is because religion began by taking the place of the sciences and philosophy.”

—Émile Durkheim

“I had always regarded the search for the absolute as the loftiest goal of all scientific activities.”

—Max Planck

“Reason in man is rather like God in the world. ... A man has free choice to the extent that he is rational.”

—Saint Thomas Aquinas

“The God whom science recognizes must be a God of universal laws exclusively, a God who does a wholesale, not a retail business. He cannot accommodate his processes to the convenience of individuals. ... Compared with what we ought to be, we are only half awake. Our fires are damped, our drafts are checked. We are making use of only a small part of our physical and mental resources....”

—William James

“But we must not follow those who advise us, being men, to think of human things, and being mortal, to think of mortal things, but must, so far as we can, make ourselves immortal, and strain every nerve to live in accordance with the best in us; for even it be small in bulk, much more does it in power and worth surpass everything.”

—Aristotle

“But goodness alone is never enough. A hard cold wisdom is required, too, for goodness to accomplish good. Goodness without wisdom invariably accomplishes evil.”

—Robert Heinlein

“Let us then exert ourselves to think well. This is the first principle of morality.”

—Blaise Pascal

“Superstition is to religion what astrology is to astronomy: the mad daughter of a wise mother. These daughters have too long dominated the earth. ... Those who can make you believe absurdities can make you commit atrocities.”

—Voltaire

“We all know that religion has been historically, and still is today, a cause of great evil as well as great good in human affairs. We have seen terrible wars and terrible persecutions conducted in the name of religion. We have also seen large numbers of people inspired by religion to lives of heroic virtue, bringing education and medical care to the poor, helping to abolish slavery and spread peace among nations.”

—Freeman J. Dyson

“Whom the Gods would destroy, they first make mad [with pride and power]”

— Anonymous ancient proverb; often plausibly-but-wrongly attributed to Euripides (484 BC - 406 BC)

“The chief evil is unlimited government, and nobody is qualified to wield unlimited power. ... Once wide coercive powers are given to governmental agencies for particular purposes, such powers cannot be effectively controlled by democratic assemblies. ... If democracy is a means rather than an end, its limits must be determined in the light of the purpose we want it to serve. ... [It] is essential that we recognize that the desirability of a particular object is not sufficient justification for the use of coercion.”

— Friedrich August von Hayek

“The chief cause of problems is solutions.”

—Eric Sevareid

“Great nations are simply the operating fronts of behind-the-scenes, vastly ambitious individuals who had become so effectively powerful because of their ability to remain invisible while operating behind the national scenery.”

—R. Buckminster Fuller

“ ‘My country, right or wrong,’ is a thing that no patriot would think of saying except in a desperate case. It is like saying, ‘My mother, drunk or sober.’ ”

—G. K. Chesterton

“Remember always that you not only have the right to be an individual, you also have an obligation to be one.”

—Eleanor Roosevelt

“It is lamentable, that to be a good patriot one must become the enemy of the rest of mankind.”

—Voltaire

“Can anything be stupider than that a man has the right to kill me because he lives on the other side of a river and his ruler has a quarrel with mine, though I have not quarreled with him?”

—Blaise Pascal

“Men in authority will always think that criticism of their policies is dangerous. They will always equate their policies with patriotism, and find criticism subversive.”

—Henry Steele Commager

“Do not ... regard the critics as questionable patriots. What were Washington and Jefferson and Adams but profound critics of the colonial status quo?”

—Adlai Stevenson

“The nationalist not only does not disapprove of atrocities committed by his own side, but he has a remarkable capacity for not even hearing about them. ... In a time of universal deceit, telling the truth becomes a revolutionary act.”

—George Orwell

“The first casualty when war comes is truth.”

—Hiram Johnson

“Of all the enemies to public liberty war is, perhaps, the most to be dreaded because it comprises and develops the germ of every other. War is the parent of armies; from these proceed debts and taxes ... known instruments for bringing the many under the domination of the few. ... No nation could preserve its freedom in the midst of continual warfare.”

—James Madison

“The supreme art of war is to subdue the enemy without fighting. ... There is no instance of a nation benefitting from prolonged warfare.”

—Sun Tzu

“War Is A Racket: I suspected I was just part of a racket at the time. Now I am sure of it. Like all members of the military profession I never had an original thought until I left the service. My mental faculties remained in suspended animation while I obeyed the orders of the higher- ups. This is typical with everyone in the military service.”

—Major General Smedley Butler, USMC.

“Every gun that is made, every warship that is launched, every rocket that is fired, signifies a theft from those that are hungry and are not fed, those who are cold and are not clothed. This world in arms is not spending money alone. It is spending the sweat of its laborers, the genius of its scientists, the hopes of its children.”

—Dwight D. Eisenhower

“In the eyes of empire builders men are not men but instruments.”

—Emperor Napoleon Bonaparte

“If it's natural to kill, how come men have to go into training to learn how?”

—Joan Baez

“Naturally the common people don't want war: Neither in Russia, nor in England, nor for that matter in Germany. That is understood. But, after all, it is the leaders of the country who determine the policy and it is always a simple matter to drag the people along, whether it is a democracy, or a fascist dictatorship, or a parliament, or a communist dictatorship. Voice or no voice, the people can always be brought to the bidding of the leaders. That is easy. All you have to do is tell them they are being attacked, and denounce the peacemakers for lack of patriotism and exposing the country to danger. It works the same in any country.”

—Gestapo founder Herman Göring

“It is said that power corrupts, but actually it's more true that power attracts the corruptible. The sane are usually attracted by other things than power.”

—David Brin

“Politics, as a practice, whatever its professions, has always been the systematic organization of hatreds.”

—Henry Adams (1838–xxxx)

“He who fights with monsters might take care lest he thereby become a monster. And if you gaze for long into an abyss, the abyss gazes also into you.”

—Friedrich Nietzsche

“Aim to understand the dragon, not defeat him; to understand the dragon is his defeat.”

—Vernon Howard

“An army of principles can penetrate where an army of soldiers cannot.”

—Thomas Paine

“Evolution, not revolution, is the best locomotive of history.”

—Andrei Sakharov

“The pessimist complains about the wind; the optimist expects it to change; the realist adjusts the sails.”

— William Arthur Ward

“Traditional scientific method has always been at the very best, 20-20 hindsight. It's good for seeing where you've been. It's good for testing the truth of what you think you know, but it can't tell you where you ought to go.”

—Robert M. Pirsig

“Our moral leanings and tastes, our sense of beauty and religious instincts, are all tributary forces in helping the reasoning faculty toward its highest achievements. ... It would be possible to describe everything scientifically, but it would make no sense; it would be without meaning, as if you described a Beethoven symphony as a variation of wave pressure. ... The intuitive mind is a sacred gift and the rational mind is a faithful servant. We have created a society that honors the servant and has forgotten the gift.”

—Albert Einstein

“He who wonders discovers that this in itself is wonder.”

—M. C. Escher

“To see a world in a grain of sand / And a heaven in a wild flower, / Hold infinity in the palm of your hand, / And Eternity in an hour....”

—William Blake

“We shall not cease from exploration, / And the end of all our exploring / Will be to arrive where we started / And know the place for the first time.”

—T. S. Eliot

“The sailor cannot see the north, but knows the needle can.”

—Emily Dickinson

“But the greatest thing by far is to have a command of metaphor. This alone cannot be imparted by another; it is the mark of genius, for to make good metaphors implies an eye for resemblances.”

—Aristotle

“The price of metaphor is eternal vigilance.”

—Norbert Wiener.

“Philosophy is a battle against the bewitchment of our intelligence by means of language.”

—Ludwig Wittgenstein

“Plato is my friend, Aristotle is my friend, but my greatest friend is truth.”

—Sir Isaac Newton

“Truth always originates in a minority of one, and every custom begins as a broken precedent.”

—Will Durant

“Truth has its own way. It works and produces effects even if party programs and textbooks refuse to acknowledge it as truth.”

—Ludwig von Mises

“In opposition to the foolish ignorabimus ((the philosophical doctrine alleging our innate-inability to ever really {discover and know} ultimate things)) our slogan shall be: **We must know — we will know!**”

—David Hilbert

That’s a wonderful quote to wrap-up with. (A variation of the boldface part appears on Hilbert’s tombstone.) When taken in its original context, that sentiment is a {truly-great, truly-realistic, truly-heroic, and truly-humane} expressions of the {truly-universal and truly-eternal} scientific spirit. **So, amen to that!!**

13. References

“Beware the man of one book.”

—Saint Thomas Aquinas

“A hundred times every day I remind myself that my inner and outer life are based on the labors of other men, living and dead, and that I must exert myself in order to give in the same measure as I have received and am still receiving....”

—Albert Einstein

All of the main ideas that we’ve often {reworded and reformulated} for this book were each derived from multiple sources. So we disclaim any {scientific or philosophical} originality — all we’ve done is try to {find and present} a more useful scientific perspective on the most important features of our awesomely-ingenious innately-scientific universe.

We’ve cherry-picked a small subset of items from perusing thousands of information sources. So compiling a reasonably academically-appropriate list of suitably-annotated references is something we’ll never be able to supply (even though we certainly appreciate the value of producing such resources).

Finally, we’ve learned a great deal from the thoughtful stimulation of the much larger number of authors that we’ve generally disagreed with on points of interest — who thus traditionally don’t merit references.

- By relevantly {extending or enriching} our explicit combinatorial fields of conceptual {conceivability and discrimination}, reasonably-thoughtful {mistakes and misconceptions} can often help us to better discern the {scope, limits, weaknesses, and suboptimal formulations} of our working knowledge.
- So we’ll close by recommending that you {judiciously and economically} cast a wide net — well beyond the sorts of {authors and topics} mentioned here.

((Under revision/expansion.))