

THEAETETUS MAKES BOOK;

AXIOTHEA READS MINDS

DIALOGUES
THAT INTRODUCE THE PHILOSOPHY OF SUBJECTIVE PROBABILITY
THROUGH THE ART OF GAMBLING ON SURE THINGS

“book.” noun . . . 9c: the record kept by a bookmaker of bets placed with him
—*Webster's Third New International Dictionary*

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PREFACE

These dialogues introduce you to recent philosophizing about the mind's contents, such as beliefs and desires. Despite the disparity between them and more obviously physical things, they too are subject to measurement. Beliefs come in degrees of conviction, desires come in degrees of intensity. Measuring these degrees takes us into mathematics. The dialogues introduce you to philosophy's mathematics of subjective probability, and they do it through the bookie's art of gambling and winning for sure. That is, the dialogues teach the bookie's art of making books of bets biased in their favor and avoiding books that are biased in favor of their clients. The latter are the Dutch books, so-called in the jargon of the race-track. I've avoided this name, for reasons I set out in the notes to the first dialogue, although it's unfortunately become popular among philosophers. I refer instead to biased books.

Although one of the dialogue's participants has the goal of becoming a bookie, the rest of them have a more theoretical goal in mind. The dialogues' participants justify their theories about degrees of conviction even more rigorously than Euclid deduced his geometry. Their gambles are the core of defenses of principles that are so axiomatic that only philosophers are not resigned to having to assume them. The defenses are called by others the Dutch book arguments, but I call them biased book arguments. The participants explain the arguments, avoiding compact formulations intelligible only to logicians, so that the rest of us can appreciate, even contribute to, what promises to be a revolution in the science of the mind.

The first dialogue presents three biased book arguments that concern the coherence of degrees of beliefs that are all accepted at the same time. I call them the static arguments. Conditional probabilities are introduced in the second, and their conformity to the axiom of probability is proved via a biased book argument invented by de Finetti in the 1930s. Conditional probabilities are static too, and much of the dialogue is devoted to defending this point and separating out issues of diachronicity, in order to put them aside. The third dialogue extends the presentation to the theory of desire. The latter two dialogues emphasize the static or synchronic nature of the initial theory. It's a misnomer, therefore, to call the theory "decision theory." It's the formal theory of belief and desire. Later dialogues, which I have written but not included here, extend the theory to the diachronic or kinematic case, the mind evolving rationally over time; that's properly called decision theory.

Let's reflect for a moment on the static nature of the theory we investigate. Despite being revolutionary, it's only a conservative extension of the folk psychological theory of the mind, in that representational states are at the heart of it and causal connection goes unmentioned. (Another of my books, *Desire and Belief*, is all about that nonmathematical theory.) Moreover, the controlling idea of the mathematical theory is the same as folk psychology's, namely, that the relation of mind to action is that the mind, insofar as it is rational, *reveals itself* or *expresses itself* in its actions, which are its actions by virtue of its *owning* them. The terms in the expression relation are synchronic; the terms in a causal relation are not.

This synchronic relation of inner to outer requires it to be universally true that actions are observed, and indeed they always are, if only by their agents. More commonly actions are in the public arena. One metaphysical claim I try to establish is that revelation or expression or ownership—this opening of the inner to the outer, using whatever name evokes its nature best for

you—is distinct from causal connection, which is the controlling idea of contemporary replacements for the folk theory or friendly amendments to it, or just plain misunderstandings of it. I acknowledge the expressive relation to be an internal relation between the inner and outer; any causal relation would be an external relation, and a description-dependent internal relationship between events cannot preclude a causal relation between them. There are intuitions to suggest that the descriptions not only leave room for a sense of incompleteness in the way they describe the events, but also need some dismantling to accommodate the needed completion in terms of causality. It is my contention, however, that any dismantling would be premature. The noncausal lessons for a formal theory of belief and desire have not yet been learned.

The two ideas, expression and causation, competing for being the controlling idea of the theory, are not mutually exclusive. They're linked tenuously through causation's mimicry of teleology by way of negative feedback mechanisms. Although mostly irrelevant to each other for the purpose of understanding belief and desire, in the long evolution of mind, the universal observability of actions (except for their ballistic components) is a consequence of the structure of negative feedback, and the prevalence of that causal mechanism allowed the process of ownership to come into being and take on an autonomous role in human agency. Those addicted to causality see the universal observability of action to be merely an uninteresting byproduct of the negative feedback mechanism, whereas I see it as key to understanding how actions differ from mere events. Furthermore, the controlling idea of ownership yields intellectual fulfillment for the theorist, replete with explanatory and predictive success without help from causality. This is hard for those addicted to causality to appreciate.

There's math up to your ears in these dialogues, but the level of mathematical training required to read these dialogues is not high. One must have a sophisticated understanding of the use of mathematics as a tool of conceptual analysis, however. So, although the mathematics is entirely at the high school level, I've been told by mathematics teachers that the concepts underlying the math would tax the typical college mathematics major. Thus the need for the padding. If I were a slipshod popularizer, I could have skipped the math altogether. But my goal is to be every bit as exact and thorough and rigorous as a mathematician. And I want it all to be accessible to the nonmathematician too. The three appendices lay out the required math for anyone with only high school skills.

The book is intended as a primer for mathematical beginners prepared to use their rudimentary math in an assault on the last great holdout to mathematicization, namely, the mind. But those already learned in this subject, who may use this book as a textbook in their teaching, will want to know what's new in it. If that means what's original with me, then not much, actually. But there is much that's recent and not yet widely known. The context is Bayesian with probabilities understood as degrees of belief:

In the first dialogue I present a single axiom for the finite probability calculus. The appendix to the dialogue proves the more usual axioms as theorems. I also present the biased book argument, whose full statement was due to de Finetti in 1937, for this one axiom from an assumption weaker than most would have thought possible, since it does not assume the calculation of expected value, nor does it make use of the concept of indifference. Criticisms of the argument by Maher and others are evaluated. There's an appendix with simple proofs of fifteen theorems in probability theory. The second appendix covers many

techniques of calculation with Venn diagrams that should give a student facility with probability and logic.

The second dialogue makes a biased book argument for the coherence of beliefs across a community, which helps us understand why we bother to argue with one another. The biased book defense of the definition of conditional probability, though presented in 1937 by Bruno de Finetti, is elaborated in rare detail; the dialogue also presents David Lewis's 1975 argument that conditional probability does not represent a degree of belief in one thing. The concept of conditional probability is explored in the context of the subjectivist theory of probability. Then Lewis's Principal Principle, relating degrees of belief and objective chance, is introduced. Finally it discusses the conflicts that arise between the ideals of wisdom and coherence. The concept of function is explained and applied to both subjective degrees of belief and to objective chance. An appendix applies the techniques developed in the first two appendices to conditional probability.

The third dialogue presents, in the person of Aspasia, Richard Jeffrey's 1965 exposé of decision theory's assumptions about causality as the theory is commonly developed. The dialogue does not present his alternative theory in any detail, however, nor another recent innovation called causal decision theory, although the case for it is prepared at the end. The dialogue is not entirely pessimistic in its conclusions. It does develop a concept of objective information. It does re-present Hacking's presentation of Huygens's justification in the 1660's of valuing gambles at their arithmetic expectation.

(The beginner, for whom this book was written, is not expected to understand the previous three paragraphs.)

The recency of the discoveries presented is something that comes through in the dialogues. Yet I've set them two thousand four hundred years ago. Why? Plato wrote a dialogue in which Socrates (who died in 399BC) and Theaetetus (the inventor of solid geometry) attempt to work out a definition of knowledge. The dialogues now in your hands are an imaginary extension of that conversation, written in the belief that the problems Plato posed there will be solved by applying probability theory to them. So, dear reader, despite my capricious setting of these dialogues in the ancient world of Socrates, you're about to work through a triumph of the very new alliance of philosophy of the mind with mathematics. May lovers of wisdom remember and enjoy these exquisite thoughts for as long a time as Plato's dialogues have been!

PERSONS IN THE DIALOGUES

Socrates, a philosopher.

Theodorus, a teacher of geometry.

Theaetetus, Theodorus's student.

Young Socrates, another student, not to be confused with the philosopher of the same name. He is also called by his alias, "Dutch."

Another Student, whose name is not given. He is called by his alias, "Shark."

Lamprocles, the no-account son of the philosopher, Socrates.

Meletus, the accuser of Socrates in Socrates's upcoming trial.

Diotima, the lady who taught Socrates the philosophy of love.

Aspasia, the lady who taught Socrates rhetoric.

Axiothea, a student of Diotima and Aspasia, (and of Plato many years later).

Lasthenia, another student of Diotima and Aspasia, (and of Plato years later).

Also: an Eleatic stranger, a taverner, an abacus salesman, two scoundrels, a girl and her dog, and a tattooed harpist named Lydia.

SETTING OF THE DIALOGUES

In Athens and Piraeus, the seaport connected to Athens where, according to Xenophon, horse races occurred regularly, and a country estate somewhere thereabouts, around 400 BC, not long before Socrates is put on trial for impiety and corrupting the morals of young people. He was convicted, and condemned to death. He chose death over making an easy escape.

For more background, see the historical notes at the end of Dialogue I.