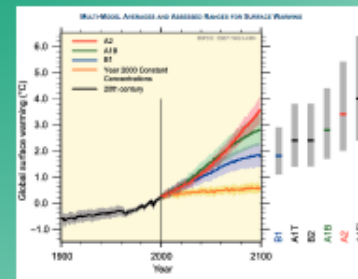
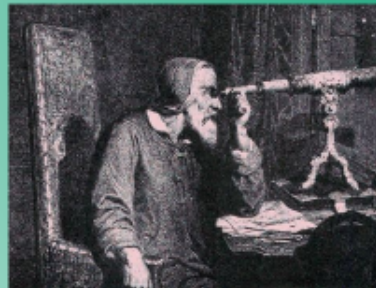
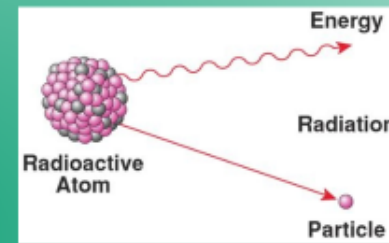
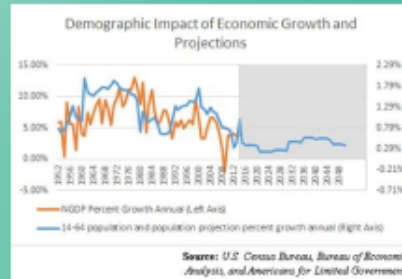


**Good predictions and bad decisions?
Philosophical thoughts on science-based decision making**

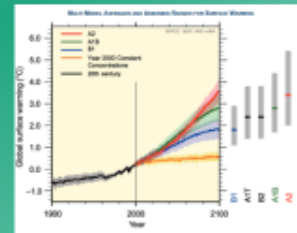
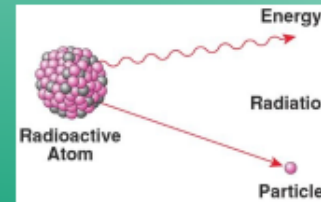
Dr. Karim Bschir
bschir@phil.gess.ethz.ch

FPF 2018 Workshop, Zurich
Predicting the safety of food contact articles: New science and digital opportunities

Why Do We Predict?



Why Do We Predict?



1. Epistemic Value:

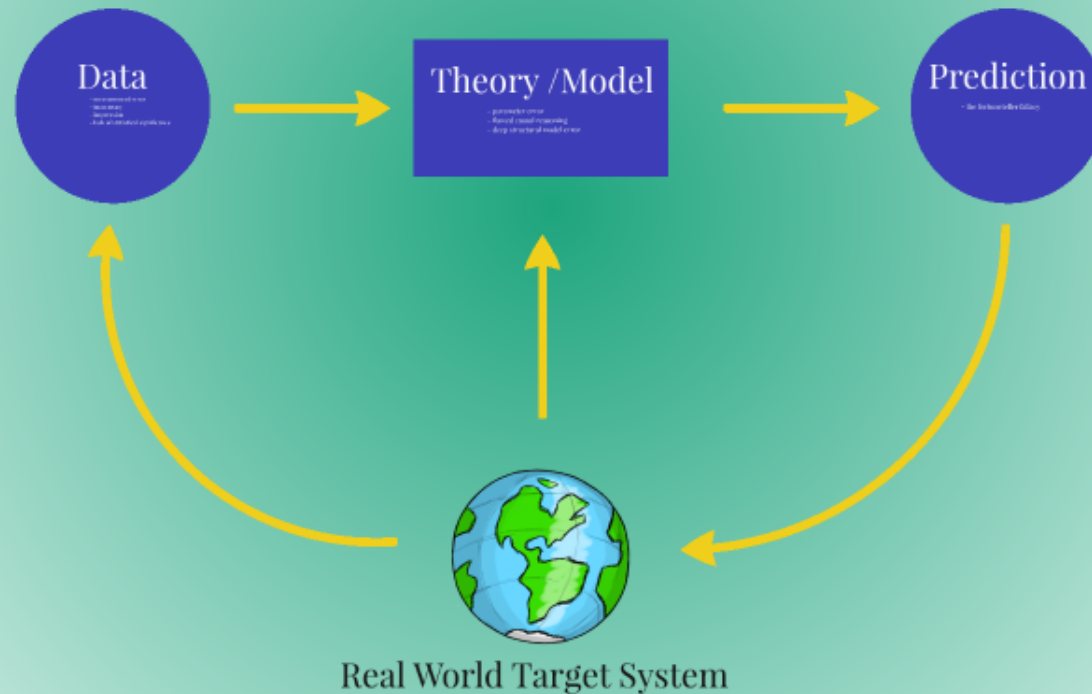
Increase knowledge & understanding
Reduce epistemic uncertainty

2. Practical Value:

Improve decision-making & human life
Reduce practical uncertainty

1. Epistemic Value:

Increase knowledge & understanding
Reduce epistemic uncertainty



Data

- measurement error
- inaccuracy
- impression
- lack of statistical significance

Theory / Model

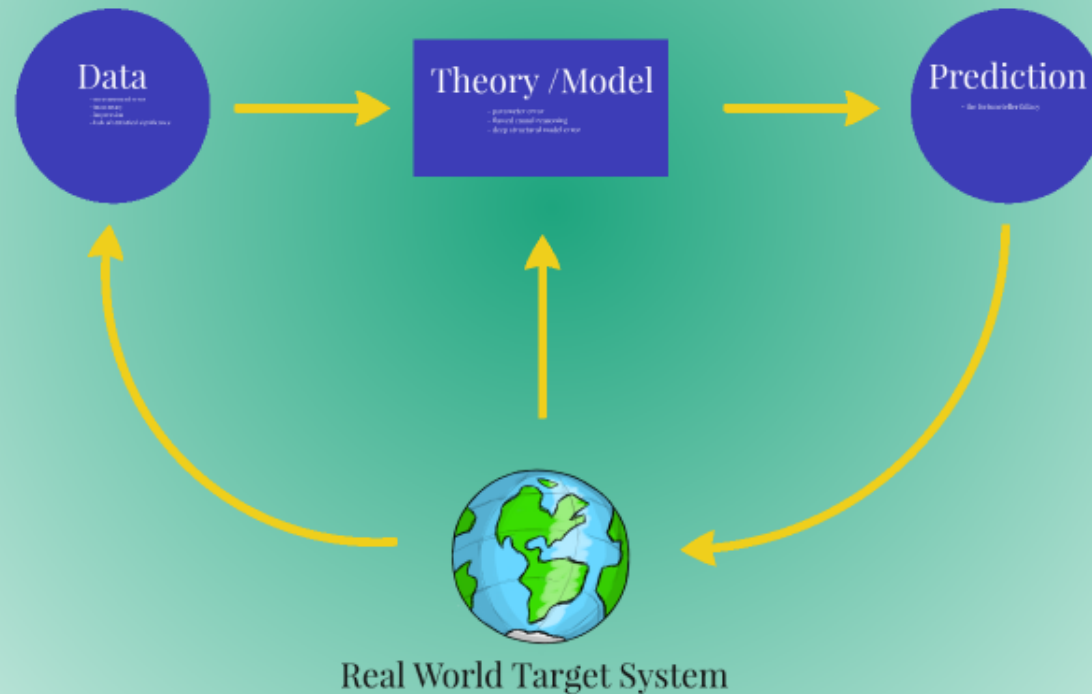
- parameter error
- flawed causal reasoning
- deep structural model error

Prediction

- the fortuneteller fallacy

1. Epistemic Value:

Increase knowledge & understanding
Reduce epistemic uncertainty



2. Practical Value:

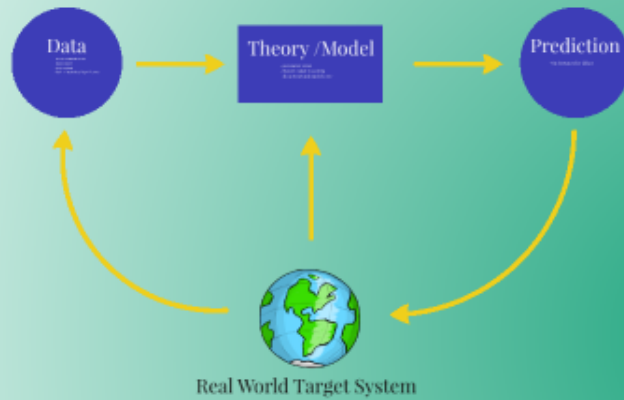
Improve decision-making & human life

Reduce practical uncertainty



1. Epistemic Value:

Increase knowledge & understanding
Reduce epistemic uncertainty

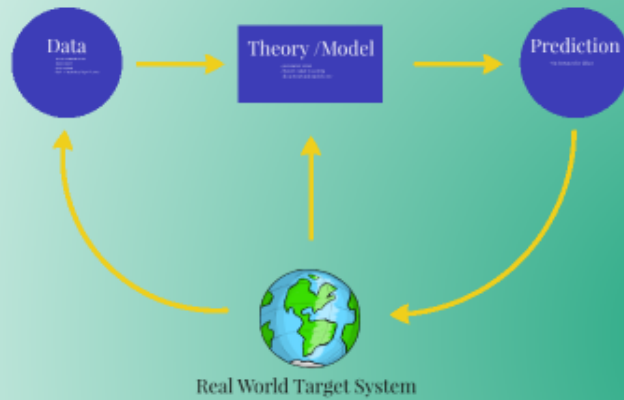


2. Practical Value:

Improve decision-making & human life
Reduce practical uncertainty



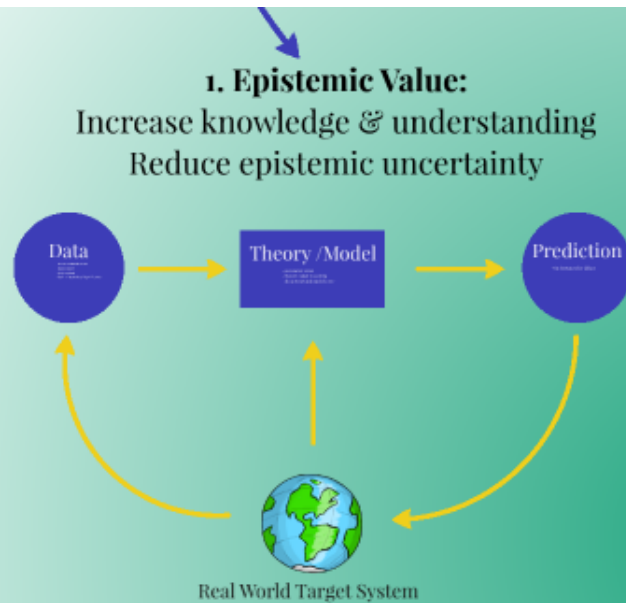
1. Epistemic Value:
Increase knowledge & understanding
Reduce epistemic uncertainty



2. Practical Value:
Improve decision-making & human life
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How are 1. and 2. related?



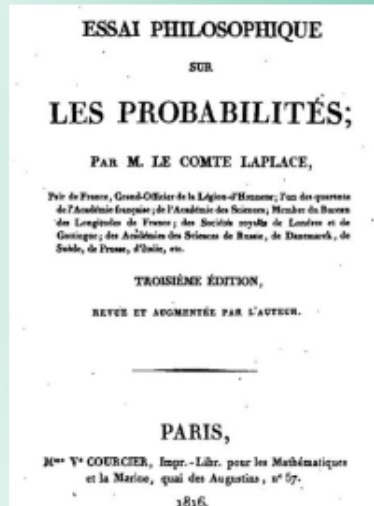
2. Practical Value:
Improve decision-making & human life
Reduce practical uncertainty



How are 1. and 2. related?

**Better predictions lead to better
decisions!**

The Ultimate Predictor: Laplace's Demon



We may regard the present state of the universe as the effect of its past and the cause of its future. An intellect which at a certain moment would know all forces that set nature in motion, and all positions of all items of which nature is composed, if this intellect were also vast enough to submit these data to analysis, it would embrace in a single formula the movements of the greatest bodies of the universe and those of the tiniest atom; for such an intellect nothing would be uncertain and the future just like the past would be present before its eyes.

Essai philosophique sur les probabilités, 1814



Pierre-Simon Laplace
(1749–1827)

The Demon Consultant

Let us assume, then, that, faced with a moral decision, we are able to call upon the Laplacean demon as a consultant. What help might we get from him? I suppose that we have to choose one of several alternative courses of action open to us, and that we want to know which of these we ought to follow.

The demon would then be able to tell us, for any contemplated choice, what its consequences would be for the future course of the universe, down to the most minute detail, however remote in space and time. But, having done this for each of the alternative courses of action under consideration, the demon would have completed his task: he would have given us all the information that an ideal science might provide under the circumstances. **And yet he would not have resolved our moral problem, for this requires a decision as to which of the several alternative sets of consequences mapped out by the demon as attainable to us is the best; which of them we ought to bring about.**

And the burden of this decision would still fall upon our shoulders: it is we who would have to commit ourselves to an unconditional judgment of value by singling out one of the sets of consequences as superior to its alternatives. **Even Laplace's demon, or the ideal science he stands for, cannot relieve us of this responsibility.**

Science and Human Values, 1960 (my emphases)

5. SCIENCE AND

HUMAN VALUES

1. THE PROBLEM

OUR AGE is often called an age of science and of scientific technology, and with good reason: the advances made during the past few decades by the natural sciences, and more recently by the psychological and sociological disciplines, have enormously broadened our knowledge and deepened our understanding of the world we live in and of our fellow men, and the practical application of scientific insights is giving us an ever increasing measure of control over the forces of nature and the world of men. As a result, we have grown quite accustomed, not only to the idea of a physics-oriented and biological technology based on the results of the natural sciences, but also to the thought, and indeed the practice, of a psychological and sociological technology that utilizes the theories and methods developed by behavioral sciences.

The growth of scientific knowledge and its applications has surely reduced the threat of some of man's oldest and most formidable enemies, among them famine and pestilence: it has raised man's material level of living, and it has put within his reach the extensions of vision which even a few decades ago would have appeared merely fantastic, such as the active exploration of interplanetary space.

But in achieving these results, scientific technology has given rise to a host of new and potentially disturbing problems. The control of nuclear fission has brought us not only the comforting prospect of a vast new source of energy,

The article first appeared in R. S. Silliman 1961, *Carl Gustav Hempel as a New Inquiry: Philosophy Department of Princeton University, 1961*. It is a revised reprint, with minor additions and some alterations, by the kind permission of the University of Pennsylvania Press.

[24]



Carl Gustav Hempel
(1905–1997)

Reducing epistemic uncertainty (i.e. increasing predictability) only leads to better decisions if:

a) the decisions are not value-laden

or

b) the value preferences are sufficiently clear

Example: pre-natal genetic diagnostics



Example: pre-natal genetic diagnostics



**... and environmental/food toxicology
???**

Example: pre-natal genetic diagnostics



**... and environmental/food toxicology
???**

**Who is responsible for defining value
preferences?**

Example: pre-natal genetic diagnostics



**... and environmental/food toxicology
???**

**Who is responsible for defining value
preferences?**

Should scientists engage in ethical debates?

Good predictions and bad decisions? Philosophical thoughts on science-based decision making

Dr. Karim Brodtkorb
brodtkor@phil.gwdg.de

FIT and Technology, Berlin
Predicting the value of food contact articles: New science and digital opportunities



Thank you for
your attention

The Ultimate Predictor: Laplace's Demon



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