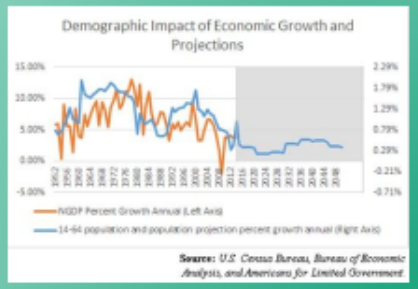
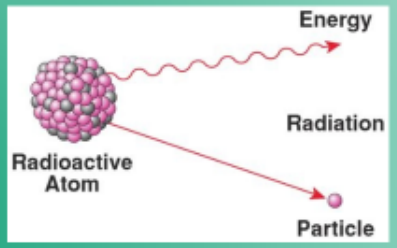
Good predictions and bad decisions?
Philosophical thoughts on science-based decision making

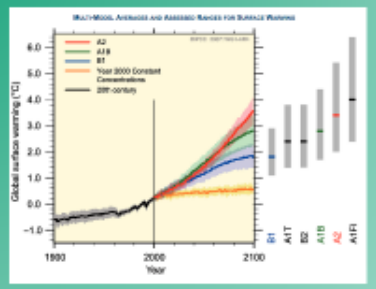
Dr. Karim Bschir
bschir@phil.gess.ethz.ch

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

Why Do We Predict?







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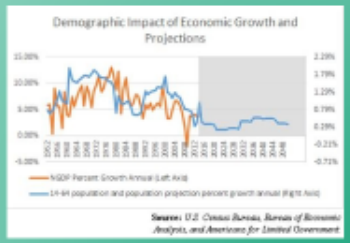
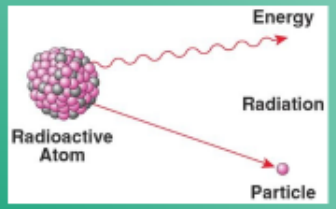
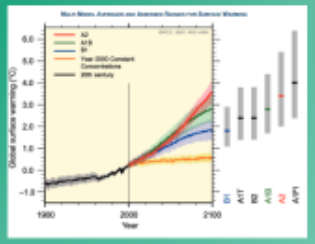
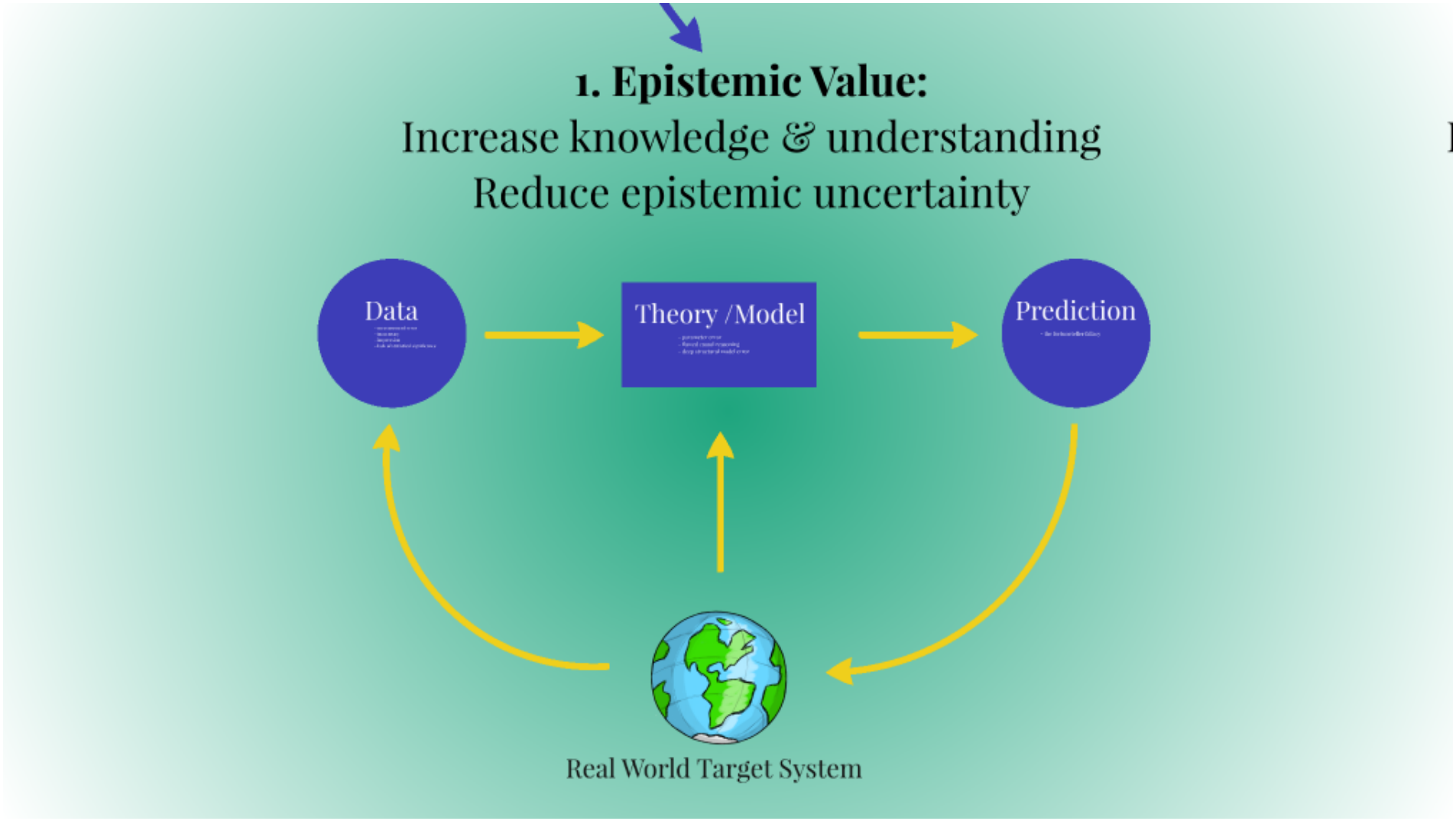






1. Epistemic Value:
Increase knowledge & understanding
Reduce epistemic uncertainty

2. Practical Value:
Improve decision-making & human life
Reduce practical uncertainty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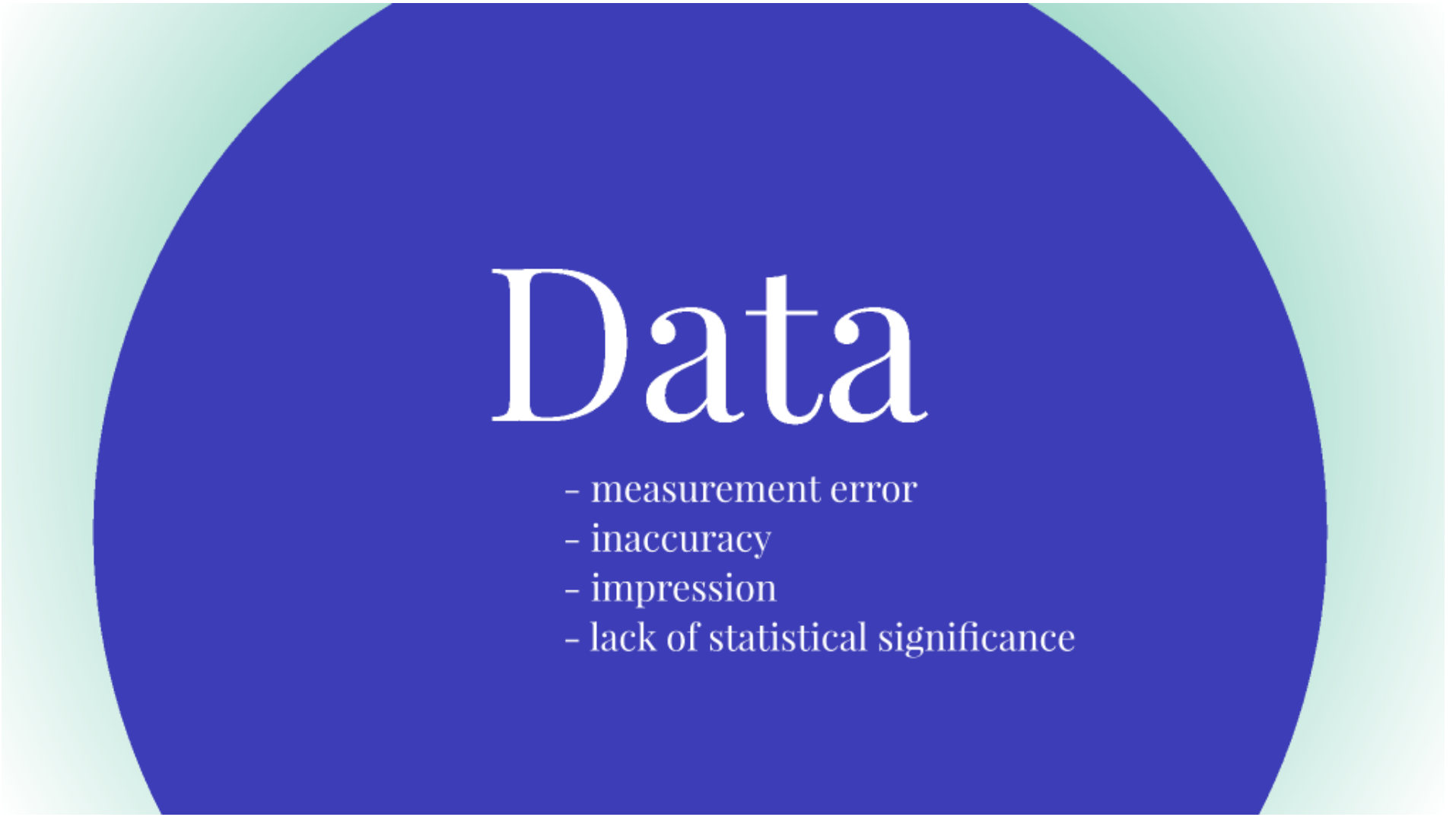
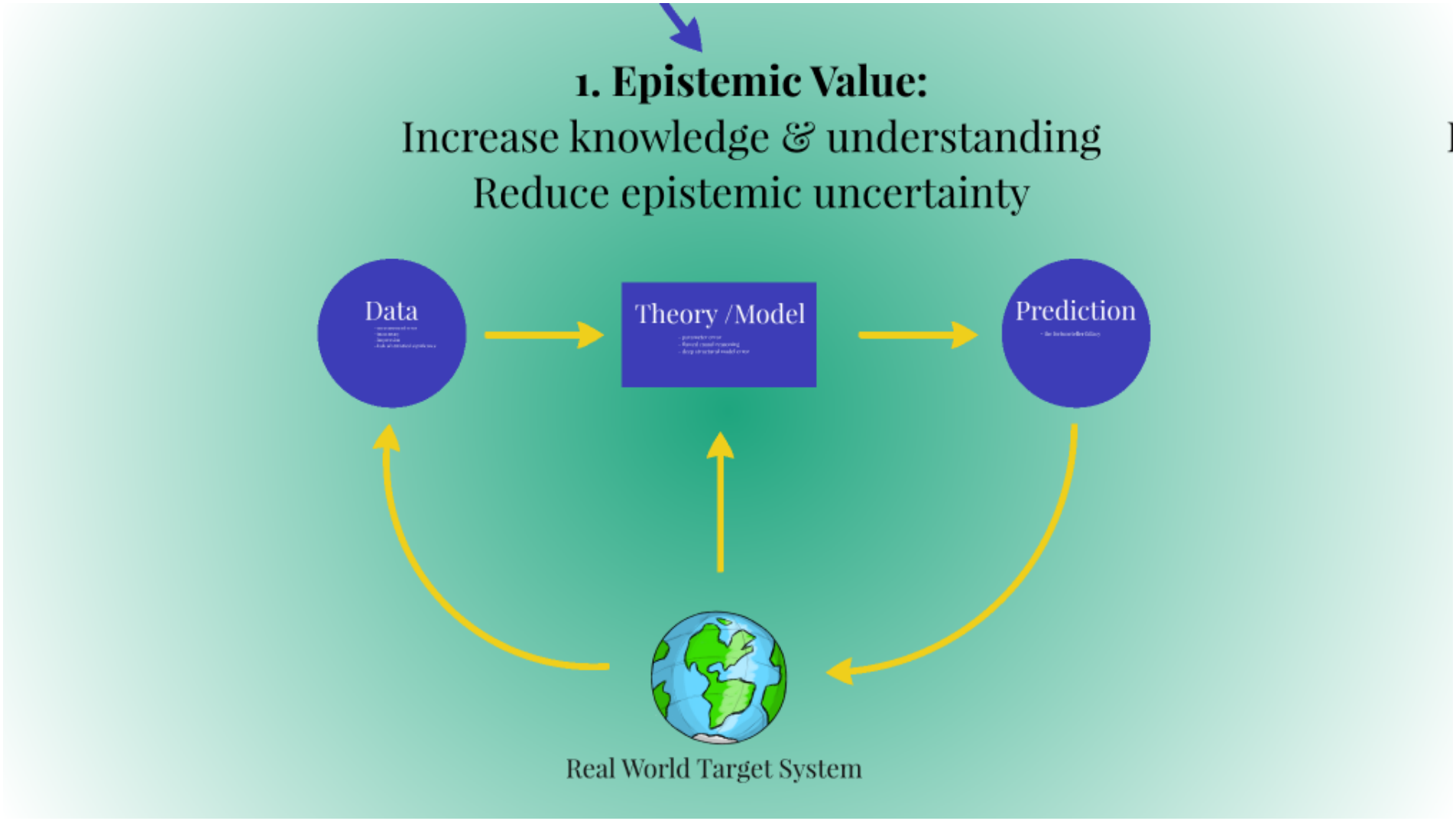
Reduce epistemic uncertainty
Data
Theory /Model
Prediction
Real World Target System


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

Theory /Model

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


Prediction
- the fortuneteller fallacy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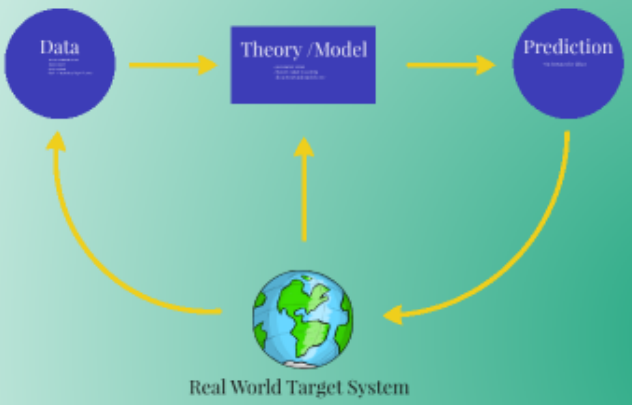

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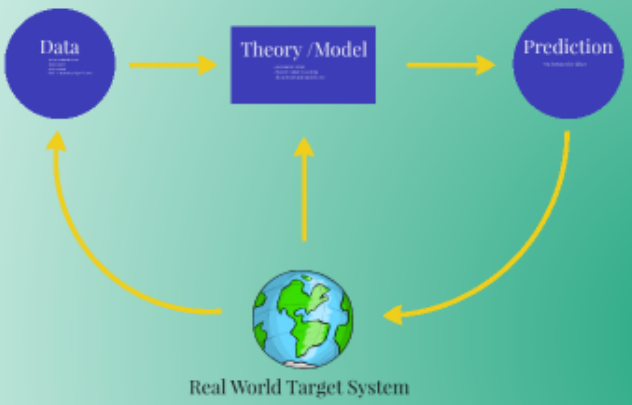

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How are 1. and 2. related?

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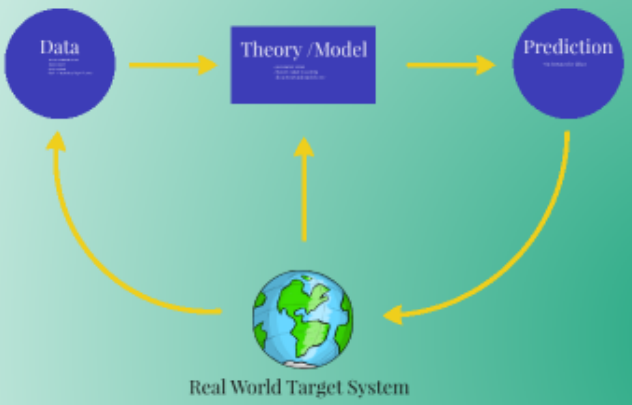

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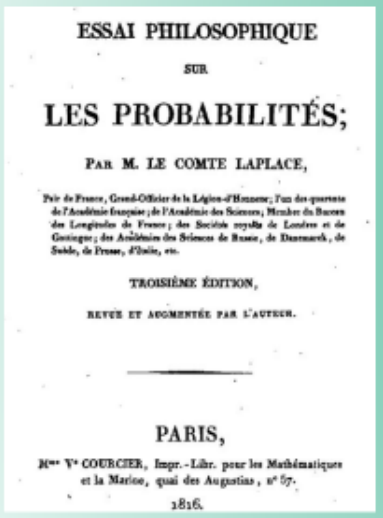
Better predictions lead to better decisions!

The Ultimate Predictor: Laplace's Demon



ESSAI PHILOSOPHIQUE

SUR

LES PROBABILITÉS;

PAR M. LE COMTE LAPLACE,

Pair de France, Grand-Officier de la Légion-d'Honneur; l'un des quarante de l'Académie française; de l'Académie des Sciences; Membre du Bureau des Longitudes de France; des Sociétés royales de Londres et de Gottingue; des Académies des Sciences de Russie, de Danemarck, de Suède, de Prusse, d'Italie, etc.

TROISIÈME ÉDITION,

REVUE ET AUGMENTÉE PAR L'AUTEUR.

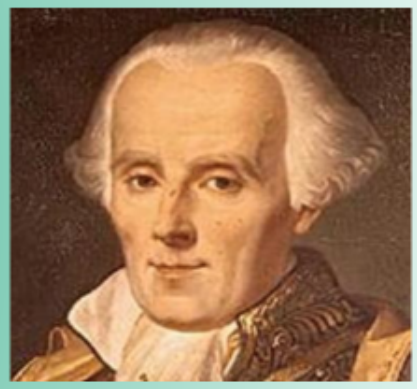
PARIS,

Mme Ve COURCIER, Impr.-Libr. pour les Mathématiques et la Marine, quai des Augustins, n° 57.

1816.

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

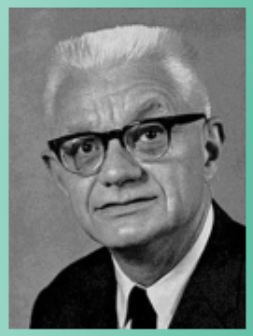


Pierre-Simon Laplace
(1749–1827)

5. SCIENCE AND

HUMAN VALUES

1. THE PROBLEM



Carl Gustav Hempel
(1905-1997)

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)

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

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... and environmental/food toxicology ???

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Who is responsible for defining value preferences?

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Should scientists engage in ethical debates?

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Thank you for your attention

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