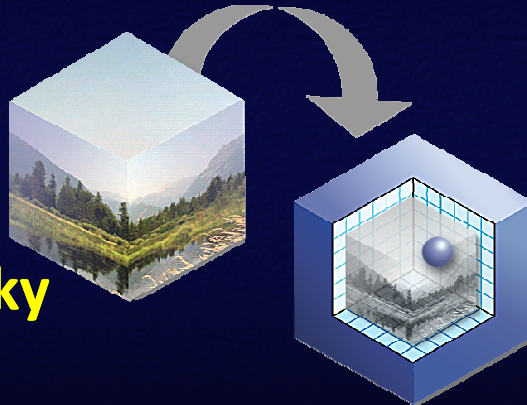


weight of evidence & environmental models

Scientific and Technical
Advisory Committee
Chesapeake Research Consortium
Quarterly Meeting, June 20, 2012

pascual.pasky
@epa.gov



abstraction of a stream



Nothing is
less real than realism...

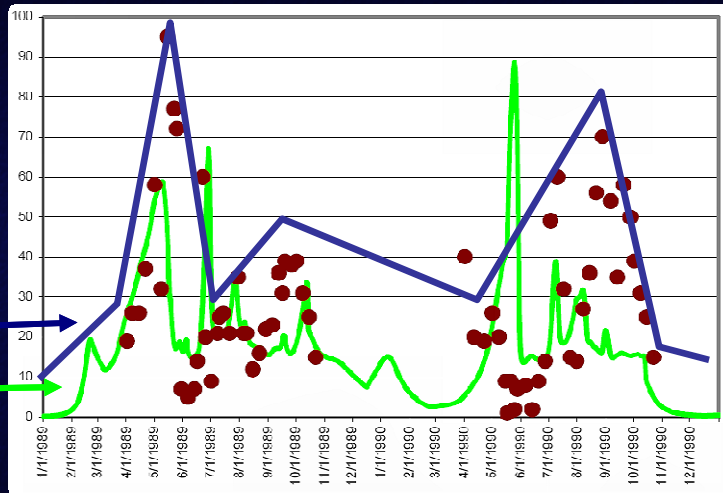
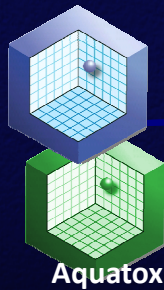
It is only
by selection,
by elimination,
by emphasis
that we get at the
real meaning of things.

Georgia O'Keefe

abstraction of a stream

chlorophyll
(ug/L)

— Model
— Observed



time

2008 Under FQPA, EPA did not explain its choice of 10-fold child safety factor when showing pesticide tolerance .



NW Coalition for Alternatives to Pesticides v. EPA (U.S. Court of Appeals, 9th Cir.)

2011 Anacostia TMDL model did not show how pollution reductions will meet designated use.



Anacostia Riverkeeper v. Jackson (U.S. District Court, DC)

2011 Under ESA, DOI's Bayesian Network Model confirmed direction and scale of threat to polar bear's existence.



In re Polar Bear Endangered Species Act Listing (U.S. District Court, DC)

Administrative Procedures Act

Action musn't be "arbitrary and capricious"

5 U.S.C. sec. 706(2)(A)

any exercise of power, including "failure to act."

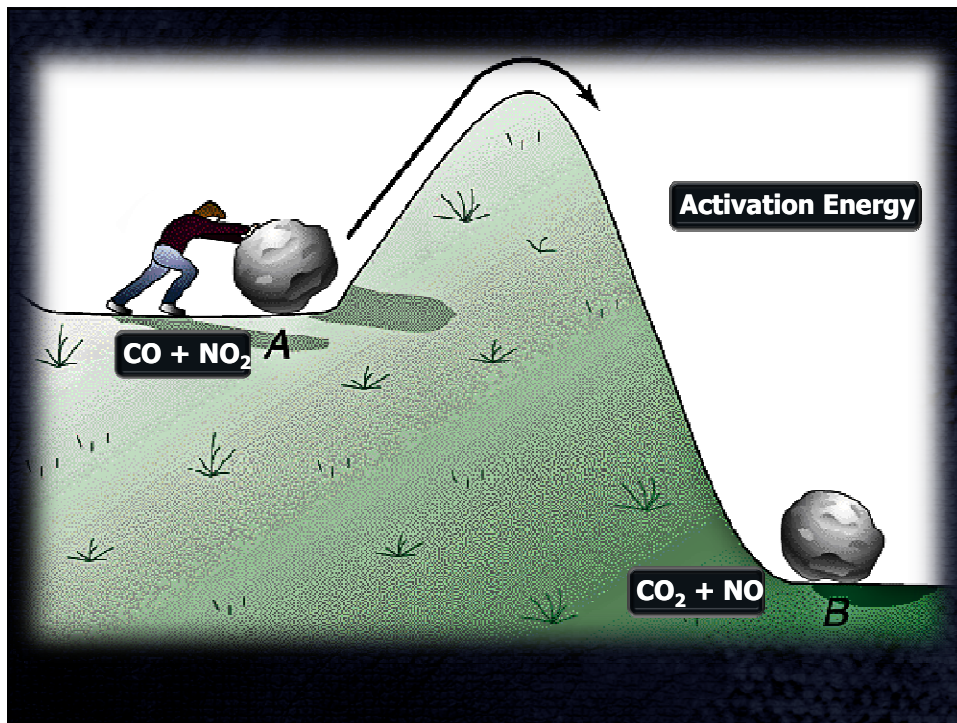
Whitman v. Am. Trucking, 531 U.S. 457 (2001)
5 U.S.C. sec. 551(13)

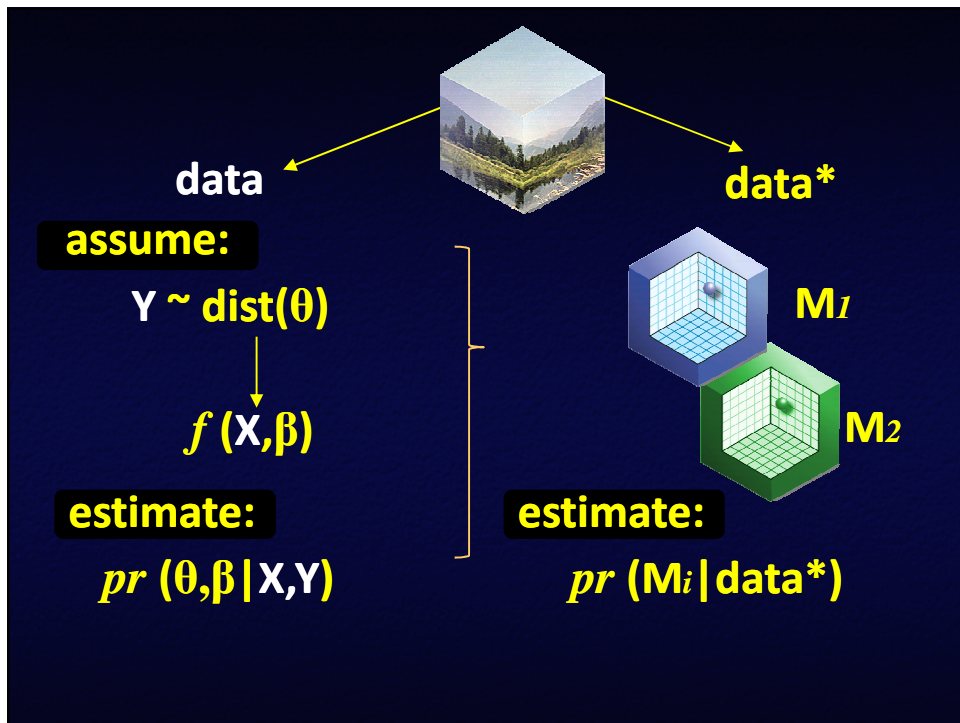
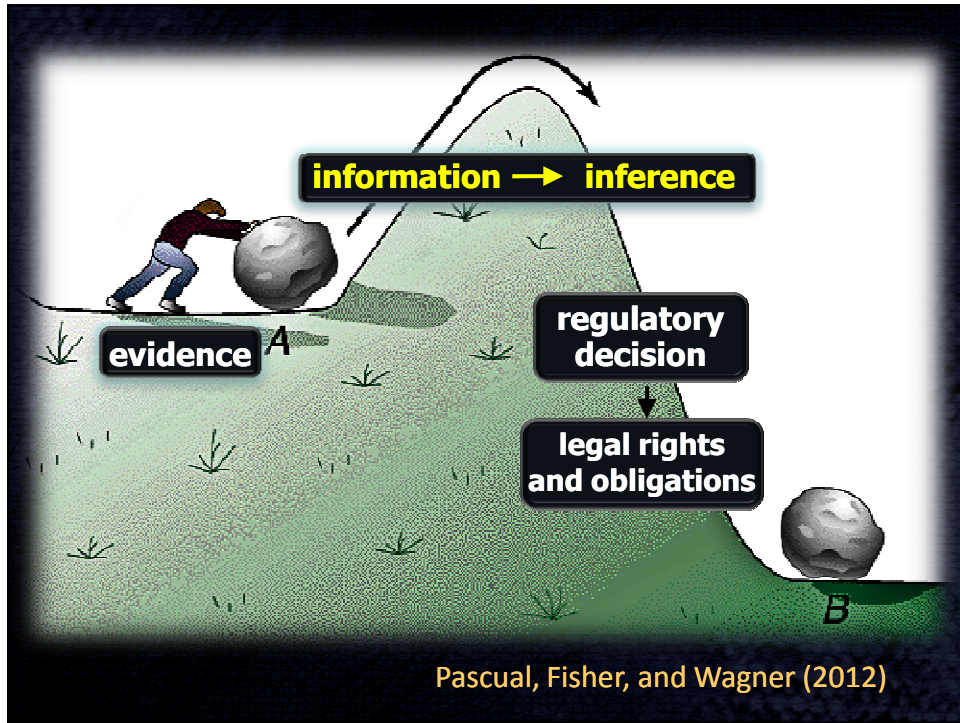
Petition to issue regulation

5 U.S.C. sec. 553(e)

"...explanations that run counter to the evidence..."

State Farm, 463 U.S. 29 (1983)







① **predictive accuracy vs. parsimony**
 $-2 \ln [pr (M_i | data)] + (2 * \text{no. of parameters})$

② **relative accuracies**

$$\left. \frac{pr (M_1 | data)}{pr (M_2 | data)} \right\} \text{BF}$$



③ **model average**

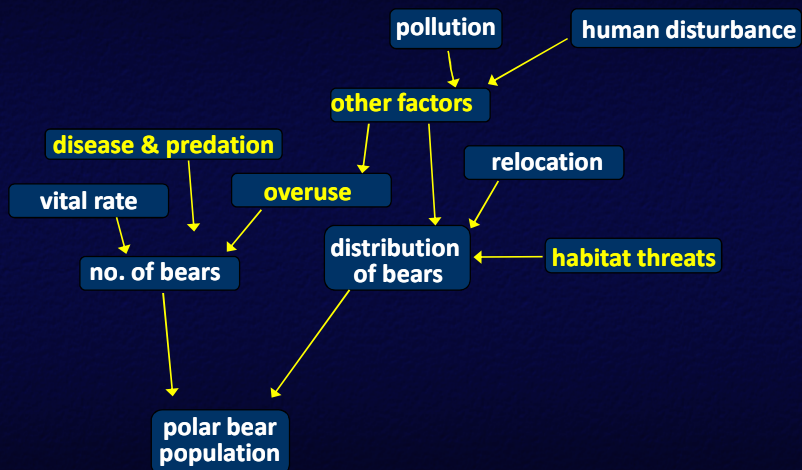
$$pr (\theta | data) = \sum pr (\theta | M_i, data) pr (M_i | data)$$

In light of epistemic uncertainty, how should policy treat multiple models?

③ **points...**

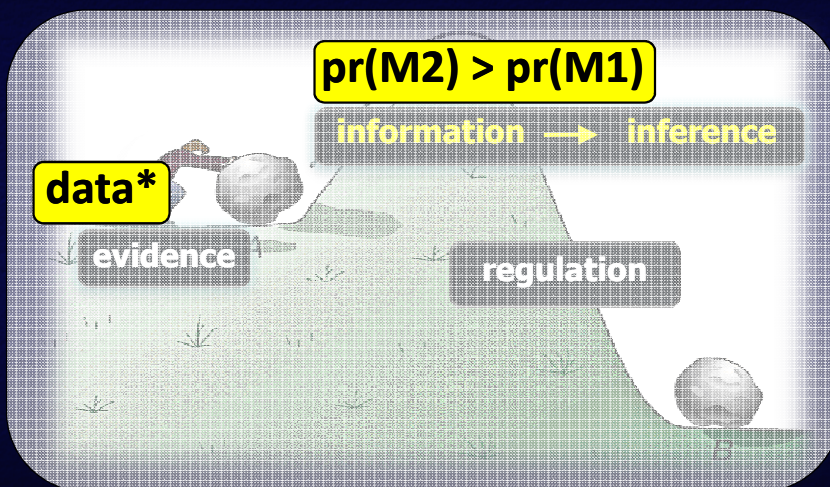
1

transparency + coherency =
rebuttable presumption of rationality



2

plaintiff may rebut by establishing:



3

justify more evidence with
value of information

$pr(Y|\text{data}, M_1)$

$pr(Y^*|\text{data}^*, M_2)$

