Beyond Subjective and Objective in Statistics

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1. Objectivity and Subjectivity in Statistics

Starting point: how are these terms used in statistics?

Foundations of Statistics

Subjective vs. objective probability discussion started around 1835 (Hacking, 1975, Zabell 2011).

Janus-faced character of probability:
epistemic, modelling belief/credence vs.
aleatory, “real world” tendency for “success”, connected to frequencies.

Before 1835, people didn’t see them separated (could identify them for fair dice etc.).

Aleatory probability:
Frequentism, propensities
seen as *objective* in the sense that
modelled phenomena are interpreted as
“existing in the real world, independent of observer.”

This, however, requires strong *idealisation*.

In reality, repetition will never happen infinitely.

The observer defines what counts as repetition (reference class problem).

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Depends on knowledge (of observer),
"objective" means "unique, given the knowledge",
derived by objective rules from "informationless state".

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"Only logic and observed facts are objective."

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Objectivity claims of frequentists and objective Bayesians are disputed,
but getting rid of trying to be objective
doesn't seem to be attractive either.

Statistical inference
(Frequentist) “error statistical” methods such as hypothesis tests, confidence intervals etc. vs. Bayesian methods requiring prior distributions.

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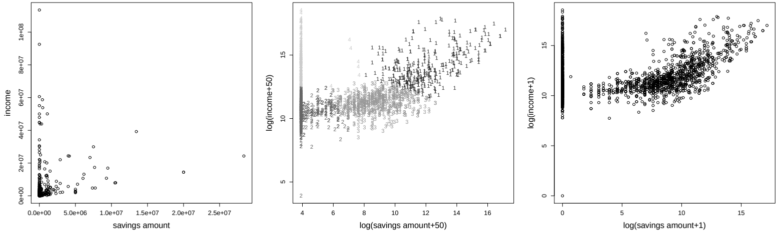
Bayesian: “objectivity claim for tests and p-values
unjustified and invites misuse.”

Other objectivity vs. subjectivity issues in statistics

Outliers, transformations, graphical data analysis, “tuning constants”:



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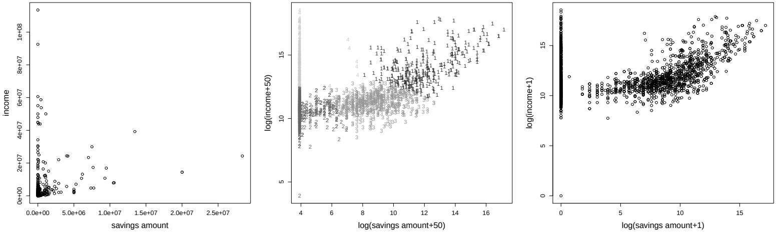

“What literature can I cite?”
“Can these be estimated from the data?”

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Objectivity is used as a marketing term,
mixing up normative and descriptive meanings.

Current subjective/objective discourse is not helpful.

2. Some general reflections on science

Various concepts of objectivity

Daston and Gallison (2007):

Mechanical objectivity - capture unmanipulated reality

Structural objectivity - mathematical/logical structures

"Truth-to-nature", trained judgement - alternative scientific virtues

Megill (1994):

Absolute objectivity - representing things as they really are

Disciplinary objectivity - consensus among experts

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In Porter (1996):

Impartiality of observers

Criticism of objectivity:

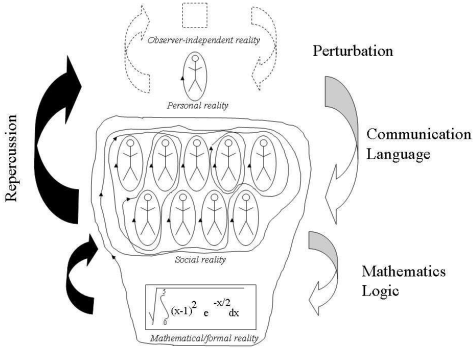
MacKinnon (1987):
“To look at the world objectively is to objectify it.”
Objectivity is a *perspective*.

Maturana (1988):
observers deny personal responsibility for their positions based on supposedly privileged access to objective reality.

All these contribute valuable arguments
to the discussion about virtues of science.

But also the many facets of the concept
contribute to confusing “marketing” use in science.

Our attitude on observations and reality (H, 2010)



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Compatible with Chang's **Active Scientific Realism**:
"I take reality as whatever is not subject to one's will, and knowledge as an ability to act without being frustrated by resistance from reality."
We acknowledge reality's "resistance"
and that this is what science is about -
without accessing "truth"
about observer-independent reality.

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Fundamental tension between ideal of objectivity and subjectivity of human observers is basic condition of science.

3. A list of virtues

The current objectivity/subjectivity discourse in statistics is not helpful. (Only in statistics?)

Instead of branding something “objective” it seems better to more precisely discuss which virtues an approach/a study has.

Also, acknowledge more explicitly how subjectivity is indispensable; and which “subjective virtues” to achieve.

Virtues connected to objectivity

1. Transparency
    a. Clear and unambiguous definitions of concepts,
    b. Open planning and following agreed protocols,
    c. Full communication of reasoning, procedures, and potential limitations;

2. Consensus

   a. Accounting for relevant knowledge and existing related work,
   b. Following generally accepted rules where possible and reasonable,
   c. Provision of rationales for consensus and unification;

3. Impartiality

   a. Thorough consideration of relevant and potentially competing theories and points of view,
   b. Thorough consideration and if possible removal of potential biases: factors that may jeopardize consensus and the intended interpretation of results,
   c. Openness to criticism and exchange;

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Still we have no better connection to reality
than observations.

Virtues connected to subjectivity

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2. Awareness of context-dependence
    a. Recognition of dependence on specific contexts and aims,
    b. Honest acknowledgement of the researcher's position, goals, experiences, and subjective point of view.

We see all these virtues as desirable, although they sometimes may oppose each other
(i.e., consensus vs. multiple perspectives)

This reflects the fundamental tension in science, which we embrace instead of suppressing it.

4. Objectivity and Subjectivity in Statistics revisited

Can use list to discuss concepts in foundations, methodology, specific studies and applications.

(Not every item applies everywhere.)

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- Connection to observables central, but not without problems (infinite repetition).
- Probabilistic testing and "falsification"
- Multiple perspectives, dependence on context and aims usually not transparent; *but could do better*.

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- Objective Bayes emphasizes consensus (though not that successful)
- Epistemic priors are not clearly connected to observations (“prior to posterior” is), testing is problematic.

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"Sampling model" is interpreted frequentist/propensity,
prior is a useful tool to "tune" methods,
neither "objective" nor "individual",
rather connected to observations, other knowledge
or frequentist properties of resulting Bayes method
such as predictive strength.

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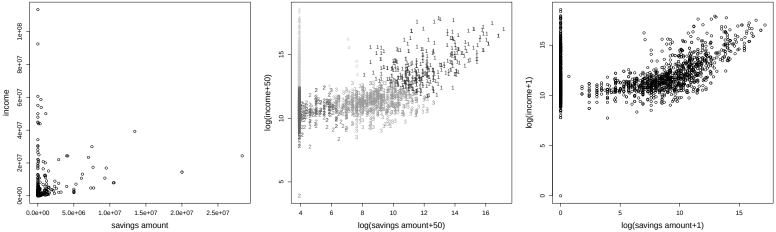
- Prior can be tested in principle (weak power).
- Prior can be used to implement multiple perspectives, objectives and aims (e.g. favour model simplicity).
- The price to pay:
  confusing variety of interpretations of prior and results.

Tuning constants (and other issues)

Encourage researchers to be open
about their choices and "non-objective" reasons
(e.g., provide subject-matter considerations for
"interpretative distance" between raw values),
sensitivity analysis explores impact of multiple perspectives.



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- List of virtues to analyze in more transparent way how concepts, methods, studies advance science (or not).
- "Objective" and "subjective" virtues may complement rather than contradict each other.
- Encourage researchers to be transparent about their decisions.
- Embrace basic tension between "observations depend on observer" and "science aims at something agreeable by all observers."