Beyond Subjective and Objective in Statistics

Christian Hennig and Andrew Gelman

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1. Objectivity and Subjectivity in Statistics

Starting point: how are these terms used in statistics?
Subjective vs. objective probability probability discussion started around 1835 (Hacking, 1975, Zabell 2011).


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”:
Other objectivity vs. subjectivity issues in statistics

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

“What literature can I cite?”
“What can these be estimated from the data?”
Observation: researchers are scared of subjectivity. Decisions are often hidden; methods are often chosen “because they don’t need tuning”, i.e., look objective.
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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
**Procedural objectivity**  - following generally agreed rules
**Dialectical objectivity**  - need active human “objectification” to treat phenomena in objective ways
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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)
Realism?

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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;
4. Correspondence to observable reality

a. Clear connection of concepts and models to observables,

b. Clear conditions for reproduction, testing, and falsification.
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Still we have no better connection to reality than observations.
Virtues connected to subjectivity

1. Awareness of multiple perspectives
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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.)
Frequentism and error statistics

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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.
Subjective and objective Bayes

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- Subjective Bayes gives multiple perspectives a clear role.
- Objective Bayes emphasizes consensus (though not that successful)
- Epistemic priors are not clearly connected to observations (“prior to posterior” is), testing is problematic.
“Falsificationist Bayes” (Gelman, Shalizi)

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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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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.
5. Conclusion

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- Encourage researchers to be transparent about their decisions.
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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.”