

# BCS 206: Research Lab Course

Peer review

# Logistics

- Results figures
- Peer review (theory)
- Tonight: short paper due
- Thu: peer feedback on papers
- Next week: final presentations

# Purpose, audience, criteria

- Gate-keeper / filter
  - ➡ Editor
  - Quality
  - Clarity
  - Originality
  - Significance
- Improvement of work
  - ➡ Authors
  - Content
  - Communication
- pre-publication vs post-publication

# Short history

- ~800 AD: “Ethics of the physician” by Ishāq ibn ‘Alī al-Ruhāwī
- 1665: Royal Society of London: 1st pre-publication peer-review
- by late 19th century: performed by editors
- since middle of 20th century: external reviewers
- since ~2000: increased experimentation with variants and attempts for systemic improvements (many critics of current journal-based system)

# How does pre-publication review work in practice

- Submit a manuscript to a peer-reviewed journal
  - *Goals:* dissemination, vetting, credit
  - *Optional:* pre-print server
- Editorial review: reject or send out for external review (~1 week)
  - *Editors:* current or former scientists
  - Publish the “best” of the on-topic submissions
- External review provides *recommendation* to editor: (~2-3 weeks)
  - Accept
  - Accept conditional on minor improvements
  - Reject but encourage resubmission after major improvements
  - Reject

# External review

- 2-3 experts chosen by editor
- authors: can recommend, or exclude
- conflict of interest: formal, informal, trade-offs
- single-blind, double-blind, open-review
  - reviewers may know each other's id, may communicate/discuss, may sign reviews
- usually unpaid
  - service to community, prestige
  - favor to editors, access to early results
- Evaluate claims based on presented data, not/rarely data itself

# Content of a review

- Comments to the editor
- Comments to the authors
- Executive summary
- Suspicion of ethical violations
- Data manipulation/fraud
- Duplicate publication
- Unethical treatment of animals/subjects
- Misc (e.g. confidence, bias)

# Comments to the authors

## Criteria:

1. Research is well designed and executed.
2. Presentation of methods will permit replication.
3. Data are properly analyzed.
4. Conclusions are supported by data.

## Feedback:

- Unbiased, on the scholarly merits and scientific value, with rationale for your opinion, non-personal
- Constructive



# Comments to the authors

1. Outline of the conceptual advance over previously published work
2. Specific recommendation with reasons
3. Summary of the specific strengths and weaknesses
  - Major
  - Minor

# Initial summary - Ex1

“This is an ambitious paper that makes both behavioral and neural predictions based on the sampling hypothesis for the implementation of probabilistic inference. Reasonably strong similarities with recent physiological and psychophysical findings are demonstrated. These results could potentially be an important addition to the literature. Unfortunately, I was confused at several places in the paper, either due to my lack of understanding or due to problems in the model. I would like to give the authors the benefit of the doubt and an opportunity to clarify these issues before I pass a final judgment.”

## Initial summary - Ex2

“Here Haefner et al explore a theoretical framework for explaining 3 recent physiological and psychophysical observations: (1) task dependent changes in noise correlations; (2) dynamics of single neuron choice probability; (3) shape of psychophysical kernels. The essence of the model is a feedback signal that relates the current belief in the environment. The work is nicely presented and the presentation is generally clear. The topics addressed here are of broad interest.

Although I am broadly sympathetic to the authors' points, there are some substantial shortcomings in the current manuscript. First,...”

# Initial summary - Ex3 (2nd round)

“This version is night and day relative to the last one: it's clear and easy to read (at least the main text is). I believe it makes an important contribution, and I'm in favor of publishing it. However, I do have some comments. Most (but not all) are technical -- I personally am interested in the technical details, and some I found hard to extract from the paper. My comments follow more or less in order of appearance.”

# Specific comments - Examples

- “Could the same basic set of effects be implemented with PPC? The authors mention briefly in the discussion that it is unlikely to be implementable with PPCs but it is not clear why.”
- “The authors claim that the difference in shape between the PK of Nienborg and Cumming and Brunton et al. is due to the intensity of the stimulus. This may be, but other reasons seem equally, or even more, probable: namely, the task is also strikingly different.”

# Specific comments - Examples

- “Finally, many of the model predictions have already been confirmed in existing datasets - this gives credit to the model, yet the authors do not produce any novel predictions (i.e. to be tested) in the core results (i.e. figures) of the paper.”
- “What are the implications of the presented data for our understanding/theoretical models of X?”

# Specific comments - Examples

- “Relating noise correlations, choice probability, and decisions in one model is nice, but the model is not mechanistic so I do not really get a sense of how neural circuits establish the relations. Rather, the model that the authors propose is very high level and it is difficult to associate many of its features with actual neural circuits (as opposed to generic feed forward or feedback pathways). In some way this is a strength of the model, since it does not tie itself down to any particular system, however it also makes the predictions that it makes less concrete.”

# Specific comments - Examples

- ““While feedback connections have largely been ignored by theoretical studies of sensory processing (except when invoking top-down attention), they are known to be both ubiquitous anatomically, and important physiologically.” --- Not an accurate characterization of the literature, in particular see the predictive coding literature (Rao, Deneve, Friston, and the recent PPC papers from NIPS 2012 and 2013 mentioned below). “



# Specific comments - Examples

- “Figure 6c: Why does CP begin to increase before 0? The authors make clear why the value at  $t=0$  is not 0.5. But it is not clear to me why there is a clear ramping in CP before the first sample, as opposed to a simple offset.”
- “14. Missing right parenthesis in Eq. 5.”
- “line 21: an inference process -> a probabilistic inference process”
- “line 190: neurons who support -> neurons that support”

# Post-publication review

- based on article
  - e.g. pubpeer, f1000
- based on underlying data
  - agreement to make data available, data repositories