

Publication & Reporting

*From Avoidance to
Transparency in Research*

GCC Rigor & Reproducibility
Workshop

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Why do we loathe Publication & Reporting?

*Think about examples in which you personally
have exhibited avoidance behaviors (e.g.,
procrastination) with respect to publication
&/or reporting in any of your current or past
research projects.*



What is Avoidance - Motivated Behavior?

Our behavior when we distract ourselves from doing a task that is associated with an unpleasant emotion, typically fear

(Approach – Avoidance)

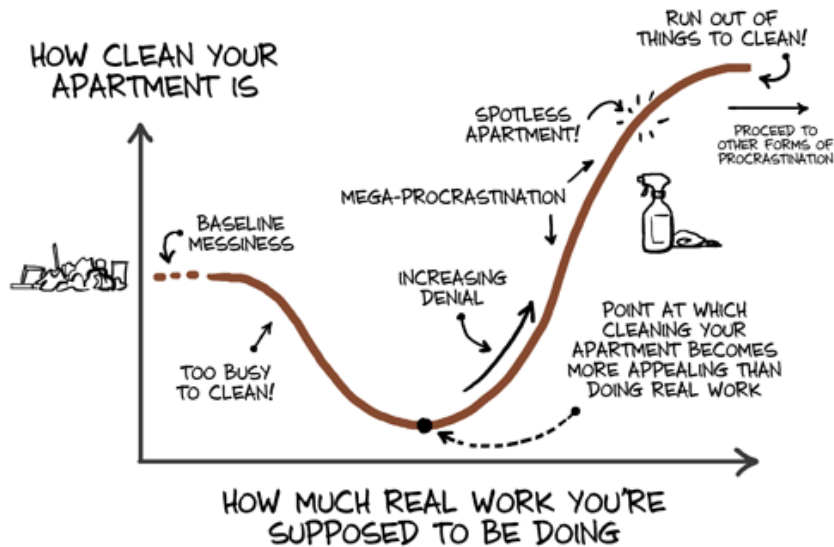
3 main types of behaviors:

- ***Complete Avoidance***
 - *No showing at a presentation, Failure to submit documents, Quit a responsibility*
- ***Escape***
 - *Leaving early from a commitment, Ending a talk abruptly, Hiding in one's office*
- ***Partial Avoidance***
 - *Daydreaming, Avoiding eye contact*
- ***Worry, Anxiety, Panic***
- ***These behaviors do not reduce anxiety, rather they can fuel it or cause difficult situations to “snowball”.***

What is Avoidance - Motivated Coping?

We do something else instead to bring momentary relief

#1 way....Procrastination



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WWW.PHDCOMICS.COM

- A FIELD GUIDE TO - PROCRASTINATORS



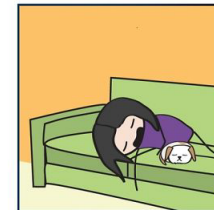
The Cleaner



The Panicker



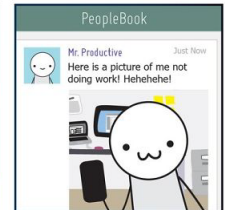
The List Maker



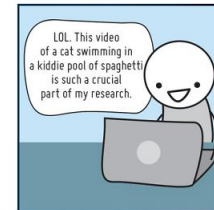
The Napper



The Sidetracker



The Social Sharer



The Internet Researcher



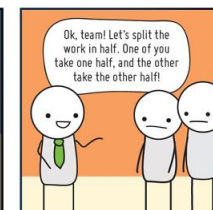
The Snacker



The Gamer



The Watcher



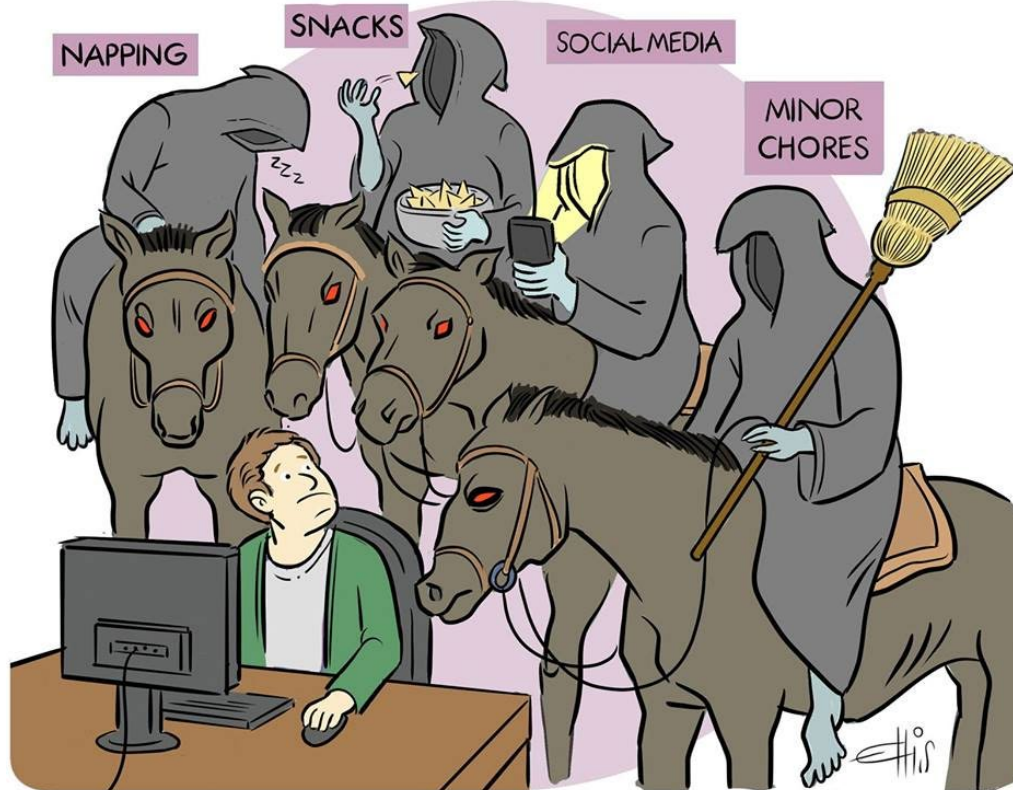
The Delegator



The Perpetuator

Modern Procrastination...

THE FOUR HORSEMEN OF PROCRASTINATION



What is Avoidance - Motivated Coping?

Doing something else instead to bring momentary relief

Data Fabrication

- Data were never collected. Data is then “made up”.

Data Falsification

- Data illegitimately altered

<https://ori.hhs.gov/>

<https://blog.frontiersin.org/2021/07/09/research-integrity-a-closer-look-at-gel-and-western-blot-image-cropping/>



Why exhibit avoidance behaviors in P&R?

FEAR

- Fear of Failure

Pressure

- Pressure to have high impact publication(s)
- Lab/Peer Pressure
- Visa/Employment Pressure



Should I publish
negative results
or does this ruin
my career in
science?

smartsciencecareer.com



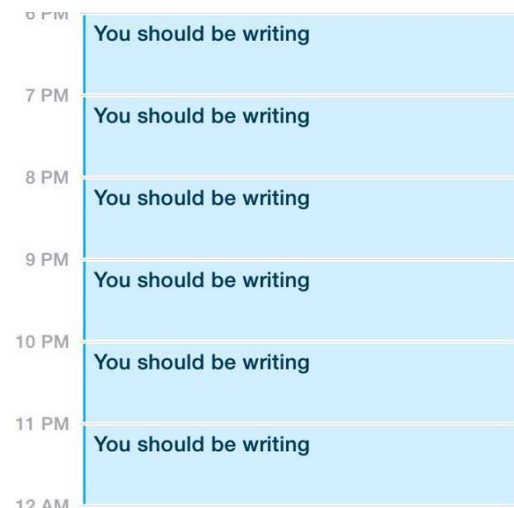
Why exhibit avoidance behaviors in P&R?

Difficulty with Time Management

- Administration & writing can take a significant amount of time away from productivity
- P&R deadlines can create time conflicts with other commitments (family, teaching, service, travel, ...)

“Lack of Progress”

- Often, we feel like we have not been productive enough... which can be paralyzing
- Difficulty in acquiring needed info (e.g. ambiguous documentation)
- Progress can feel like a moving target

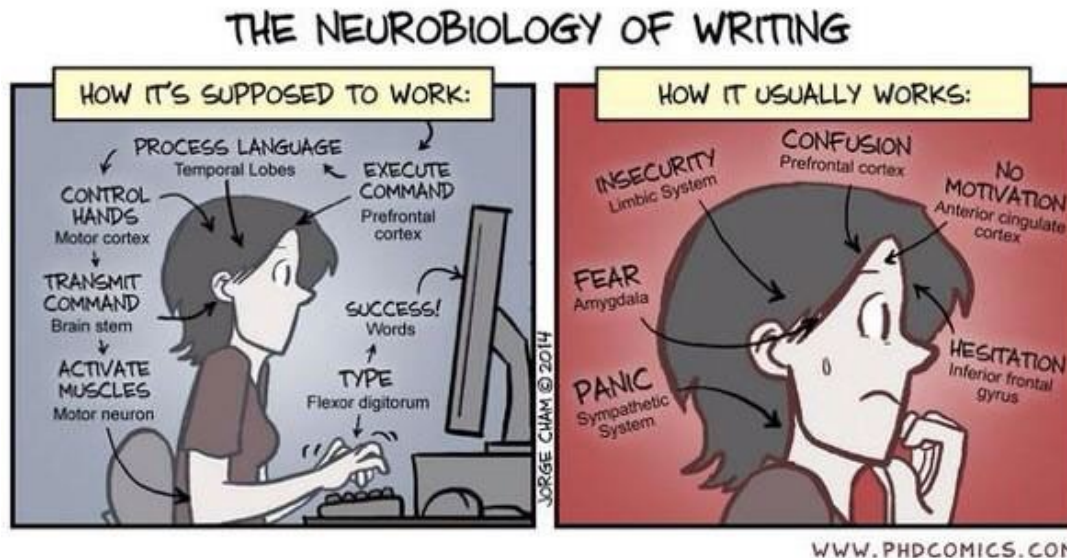


Avoidance Impacts P&R

- Missed Deadlines
- Delayed Publications
- Late Reports to Regulatory & Funding Entities
- May Impact Promotion & Tenure, Career Advancement

"Procrastination makes
easy things hard and
hard things harder."

— Mason Cooley



Publication & Products of Research

Most commonly sought products of research

- Peer-review publications in top-tier journals
 - May require open access agreements for data produced
- Conference papers / podium presentations
- Abstracts / conference posters
- Technology Development &/or Techniques
- Inventions: Patents, patent applications (NPA, PPA), licensing agreements
- “Other”
 - **Databases**, physical collections, A/V products, software, instrumentation, interventions, educational aids

Publication & Products of Research

Who does the work?

- PI / Co-Is are typically senior authors
- Post-docs, Research Assistants
- Graduate Students, possibly Undergrad students
- Lab Techs



Typically, these are team efforts which the PI supervises

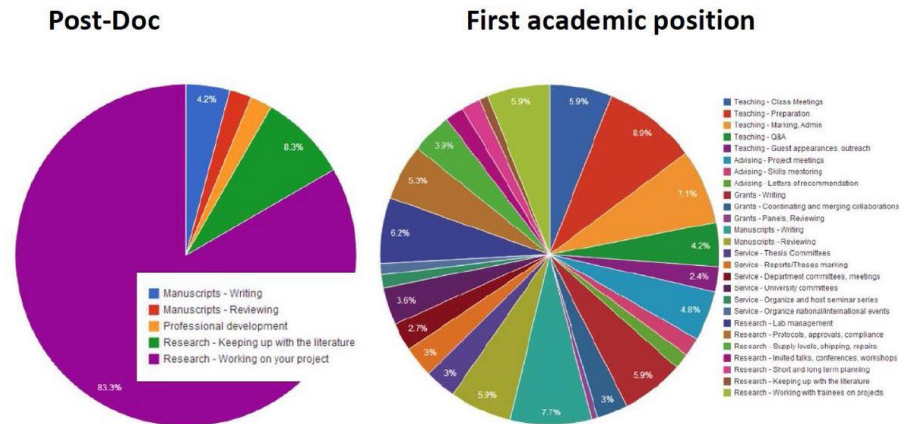
- PI can ideally spend time to other projects and commitments
- Majority of work likely done by junior scientists / trainees***
- *Avoidance behaviors exist @ all levels of science*

Research Reporting

Common types of reporting in research

- Department/Center/University Annual Reports
- IRB / Human Subjects Protection
- IACUC / Animal Research Oversight
- Federal Regulatory Bodies (eg. FDA)
- **Funding / Grants**
 - Federal (NIH, NSF, etc)
 - State (CPRIT)
 - Local (Dunn Foundation)
 - Private Foundations (AHA, ADA, etc)

Post-Doc vs. Assistant Prof.



Research Performance Progress Reports (RPPRs)

Federally mandated format required by NIH

- Similar formats & information required by other funding bodies
- Typically done on an annual basis

Only the PI or a noted delegate can initiate

- This can require a major time & resource commitment by the PI
- Majority of work likely done by PI
 - *May have to formally submit the document to the funding body & institution*

Does your institution have administrative resources to help you with this?

- Ask your administrative staff about this!!!

RPPR Required Components

Accomplishments

- What were the major goals and objectives of the project?
- What was accomplished under these goals?
- What opportunities for training and professional development did the project provide?
- How were the results disseminated to communities of interest?
- What do you plan to do during the next reporting period to accomplish the goals and objectives?



RPPR Required Components



Publications & Products

- Preliminary Data?

Patient (or Animal) Recruitment and Safety Reports

Collaborative Efforts

- Collaborating Institution Reports
- Multi-site projects?

Impact

- Are you producing a sustained powerful influence in your research area with your progress?

RPPR Required Components

Project Changes, Challenges, & Problems

- Changes in approach and reasons for change
- Actual or anticipated problems or delays and actions or plans to resolve them
- Changes that have a significant impact on expenditures
- Significant changes in use or care of human subjects, vertebrate animals, biohazards, and/or select agents

Financial / Budgetary Reports

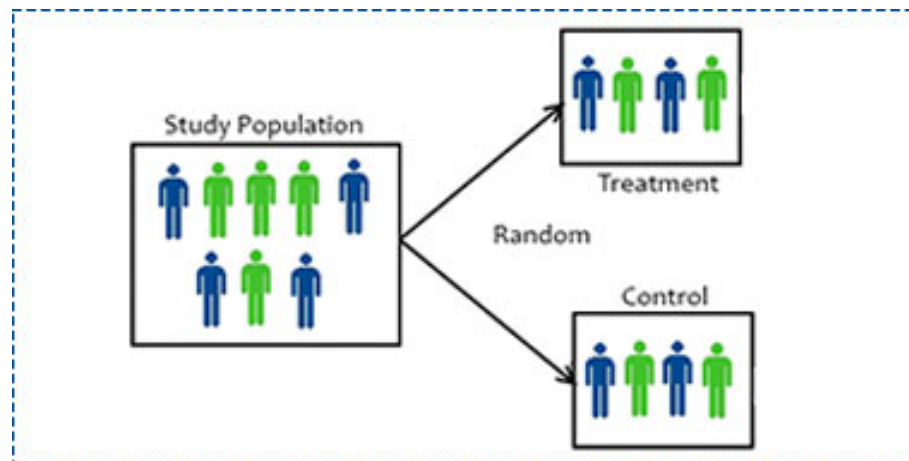
Modifications &/or Future Plans?



Core Reporting Standards - Manuscripts

1. Randomization

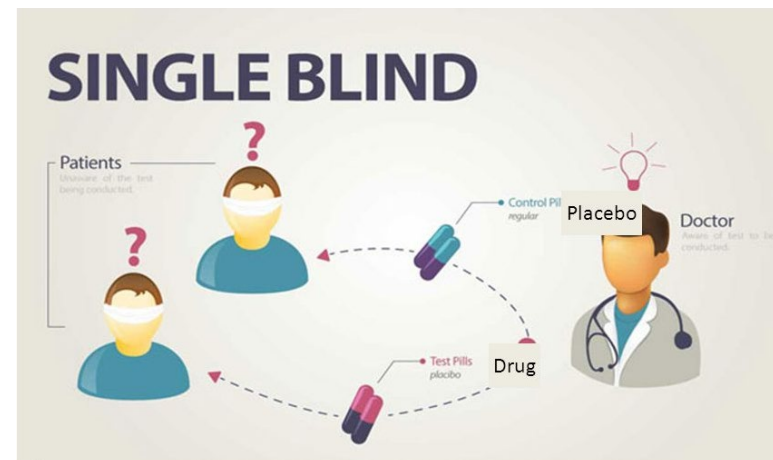
- Animals &/or human subjects should be assigned randomly to the various experimental groups, and the method of randomization reported.
- Data should be collected and processed randomly or appropriately blocked.



Core Reporting Standards - Manuscripts

2. Blinding (single, double, triple)

- **Allocation concealment:** Investigator(s) should be unaware of the group to which the next animal taken from a cage will be allocated.
- **Blinded conduct of the experiment:** Animal caretakers and investigators conducting the experiments should be blinded to the allocation sequence.
- **Blinded assessment of outcome:** Investigator(s) assessing, measuring, or quantifying experimental outcomes should be blinded to the intervention.



Core Reporting Standards - Manuscripts

3. Sample Size & Estimation

- An appropriate sample size should be computed & utilized
- The statistical details of computation should also be reported, including variability measures

	Measure	units	Control	Patient	α	Power	n / group
<i>Aim 1</i>	CV Score ¹²	--	0.10 ± 0.09	0.21 ± 0.09	0.05	80%	14
	DFA Score ¹⁹	--	0.89 ± 0.04	0.96 ± 0.04	0.05	80%	7
	Response Time ¹²	ms	926.8 ± 63.7	1021 ± 72.9	0.05	80%	10
	Accuracy ¹²	%	78.1 ± 14.6	60.3 ± 10.4	0.05	80%	10
<i>Aim 2</i>	Age at Diagnosis¹⁶	years	51.32 ± 6.02	43.45 ± 10.82	0.05	80%	21
<i>Aim 3</i>	BMI ¹⁶	kg/m ²	26.52 ± 6.79	33.78 ± 5.58	0.05	80%	13
	Cholesterol ¹⁵	mg/dL	58.76 ± 14.25	35.83 ± 11.16	0.05	80%	17

Core Reporting Standards - Manuscripts

4. Data Handling

- Rules for stopping data collection should be defined in advance.
- Criteria for inclusion and exclusion of data should be established prospectively.
- How outliers will be defined and handled should be decided when the experiment is being designed, and any data removed before analysis should be reported.
- The primary end point should be prospectively selected. If multiple end points are to be assessed, then appropriate statistical corrections should be applied.
- Investigators should report on data missing because of attrition or exclusion.
- Pseudo replicate issues need to be considered during study design and analysis.
- Investigators should report how often a particular experiment was performed and whether results were substantiated by repetition under a range of conditions.

Hurdles to P&R?

Project Changes, Challengers, & Problems

- Difficulties in starting &/or running a project
 - *Instrumentation, Participants, Lab Staff, Time, Funding, ...*
 - *Lack of progress due to such difficulties*

Difficulty organizing required information by stated deadlines

- Time conflicts, communication challenges, ...

Little to no institutional support

- Some PIs need to fill out the report and submit it in its entirety
- A lot of time can be devoted to understanding what info is required, especially without administrative support

Competition



If P&R is so tough, why bother?

Negative Consequences

- Withdrawal of funding
- Inability to support current & future projects
- Inability to achieve promotion, tenure, career advancement, ...

If P&R is so tough, why bother?

Lack of P&R means that biases can be introduced into the evidence base

Reporting Bias

- Selective revealing (or suppression) of information/outcome of a study
- Reporting some results, but not all results
- “Spinning” of unexpected or undesirable results
 - *Attributed to sampling or measurement errors*



Reporting Biases associated with P&R

Publication Bias

- Essentially this is non-publication of results
- Typically due to failure of an intervention
 - *Lack of “positive” or “significant” results*

Outcome Reporting Bias

- **AKA: Expectation Bias**
- Selective reporting of results
- Modification of hypotheses to fit findings
- Less likely to report adverse outcomes
 - *Suppression*
 - *Highly problematic for drug & device trials*



Reporting Biases associated with P&R

Citation Bias

- Tendency to cite positive findings more frequently
- May lead to perception that an intervention is more effective than it truly is, due to differential in number of citations
- Over-representation of positive findings

Location Bias

- Refers to journal of publication & impact factors
- Studies with “positive” and “significant” results tend to be
 - *Published in journals with higher impact factors*
 - *Published in journals with better access (eg. indexed)*

19th century scientist

I must find the explanation for this phenomenon in order to truly understand Nature...



21st century scientist

I must get the result that fits my narrative so I can get my paper into Nature..



Reporting Biases associated with P&R

Language Bias

- Publication of positive findings in a specific language
 - *e.g. English*
- Non-significant results may be published in non-English language journals
- May impact meta-reviews and systematic review results

Time Lag Bias

- Rapid publication of exciting, but not full results
- Delay in publication of negative or non-significant findings
- Delayed publication can also occur if a PI is trying to boost “productivity” under a specific grant



Reporting Biases associated with P&R

Funding Bias

- Tendency of a scientific study to support the interests of the study's financial sponsor
- Predetermined conclusions may bias researchers into an expectation bias / outcome reporting bias
- Some sponsors require PIs to waive the right to publish findings that do not support the sponsor's interests
 - *Associated with publication bias & outcome reporting bias*
- Study design may be flawed from the start



Strategies in Addressing Bias in P&R

Build

... a case in which negative results can provide a positive impact on the evidence base

Don't suppress

... results, particularly negative results or "non-significant" results

Don't rush or delay

... publication, also don't "dual submit"

Avoid

... publishing the same results in more than one manuscript unless there is a very good reason to do so (new analyses, etc.)

Consider

... the impact factor, scope, and audience of the journals you submit to (*International? Clinical?*)

Try

... to balance the story you tell with respect to citations

Use

... references from journals that adhere to NIH R&R guidelines

Strategies in Addressing Bias in P&R



**Don't withhold
critical information**



**Discuss authorship
& team
expectations early
on in the process**



Be organized



**Set realistic goals
for yourself and
your team**

May need to reprioritize



COMMUNICATE: If you are a team leader/PI and you detect stress in one of your team members, it is generally better to check in with that team member than try to wait it out.

Strategies in Addressing Bias in P&R

Report on the following:

- Randomization techniques
- Use of blinding
- Sample size estimation
- Data handling



Look for these hallmarks in the literature you use to build your studies!

Strategies in Addressing Bias in P&R

Use ALCOA Principles for Managing Data Quality

- Atributable
- Legible
- Contemporaneous
- Original
- Accurate

Maintain Data Integrity

- Complete
- Consistent
- Enduring
- Readily Available

Strategies in Addressing Bias in P&R

Know

... the strengths & weaknesses of your team

Know

... your deadlines

Know

... your resources (*Do you have administrative support? How much? What type?*)

Know

... what components are needed for reporting

Familiarize

... yourself with expectations of editors, review boards, funders, & your institution

A New Year's Resolution...

What can you (&/or your lab) do this year to improve your relationship with publication, reporting, & bias?

Come up with 2 - 3 resolutions with implementation strategies to share & discuss with your breakout group.

