CNAP CENTER
COGNITIVE & NEUROBIOLOGICAL APPROACHES TO PLASTICITY

Strategies for Proposal Success 2.0

CNAP Brown Bag, October 26, 2022

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Recap- Strategies for Maximizing Proposal Success (1.0)

- Select the right opportunity
- Get your grant to the correct panel
- Work ahead!
- Utilize external pre-review
- Be strategic with resubmissions
- Bonus tips/tricks

Maximizing Proposal Success (2.0)

- CNAP Top Half Initiative
- Lessons from NIH Published Data
- Analysis of CNAP proposals
- Ideas for improvements

NIH Study Section Primer

- Application assigned to 3 reviewers
  - Rev 1 and 2 usually strong experts
  - Rev 3 usually general expert
- Reviewers each assign scores (1-9; lower is better)
  - Score individual components of: Approach, Significance, Innovation, Investigators, Environment
  - Also assign overall impact score
  - NIH does not instruct reviewers on how to weight component scores in determining overall impact
- Study section organizer computes the average overall impact score for each grant and rank orders those scores
  - The top half of the grants are automatically discussed
  - Reviewers of bottom half grants can nominate a grant for discussion (but this is fairly rare)
  - Grants are discussed from best to worst over the course of 1 – 2 days of meetings
- If your grant is not discussed, then you get the initial scores and reviews

NIH Study Section Primer

- For grants that are discussed:
  - Each reviewer presents scores and a synopsis of the grants
  - Discussion aims to work out differences in opinions
  - Other panel members can ask questions (they may have read your grant as well)
- Following discussion, the three reviewers provide their final overall impact score
  - This sets the range for voting
  - All panel members assign an overall score
- Reviewers can go back and change their reviews following discussion
  - This is common
- You receive a summary of discussion as well as the reviews and scores

The CNAP "Top Half Initiative"

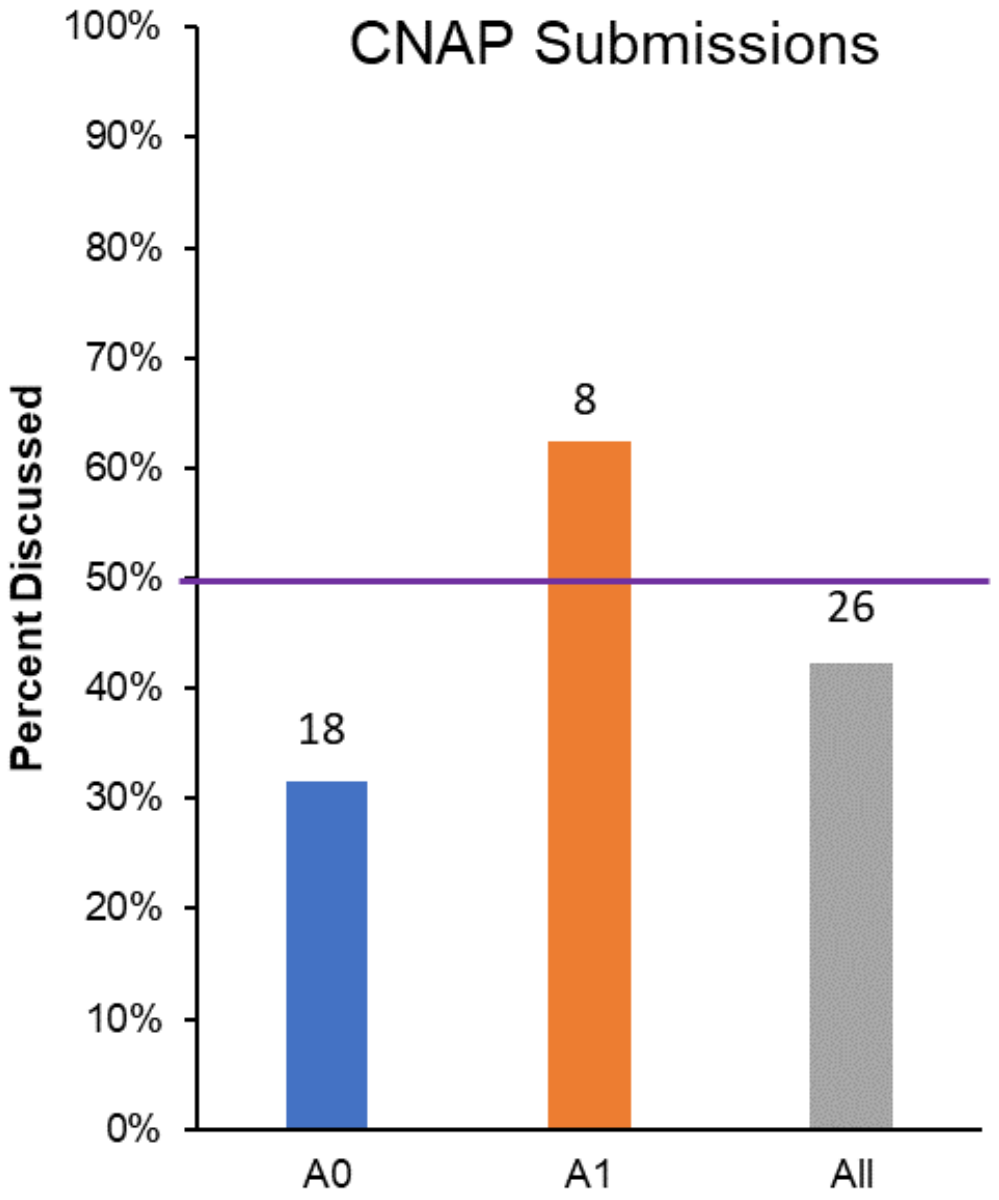
Want at least 50% of first submissions receiving scores in the top half

At NIH, Top Half grants get more extensive feedback through the discussion process

Grants that are in the top half (but not funded) are much more likely to get funded on a second try (i.e., re-submission)

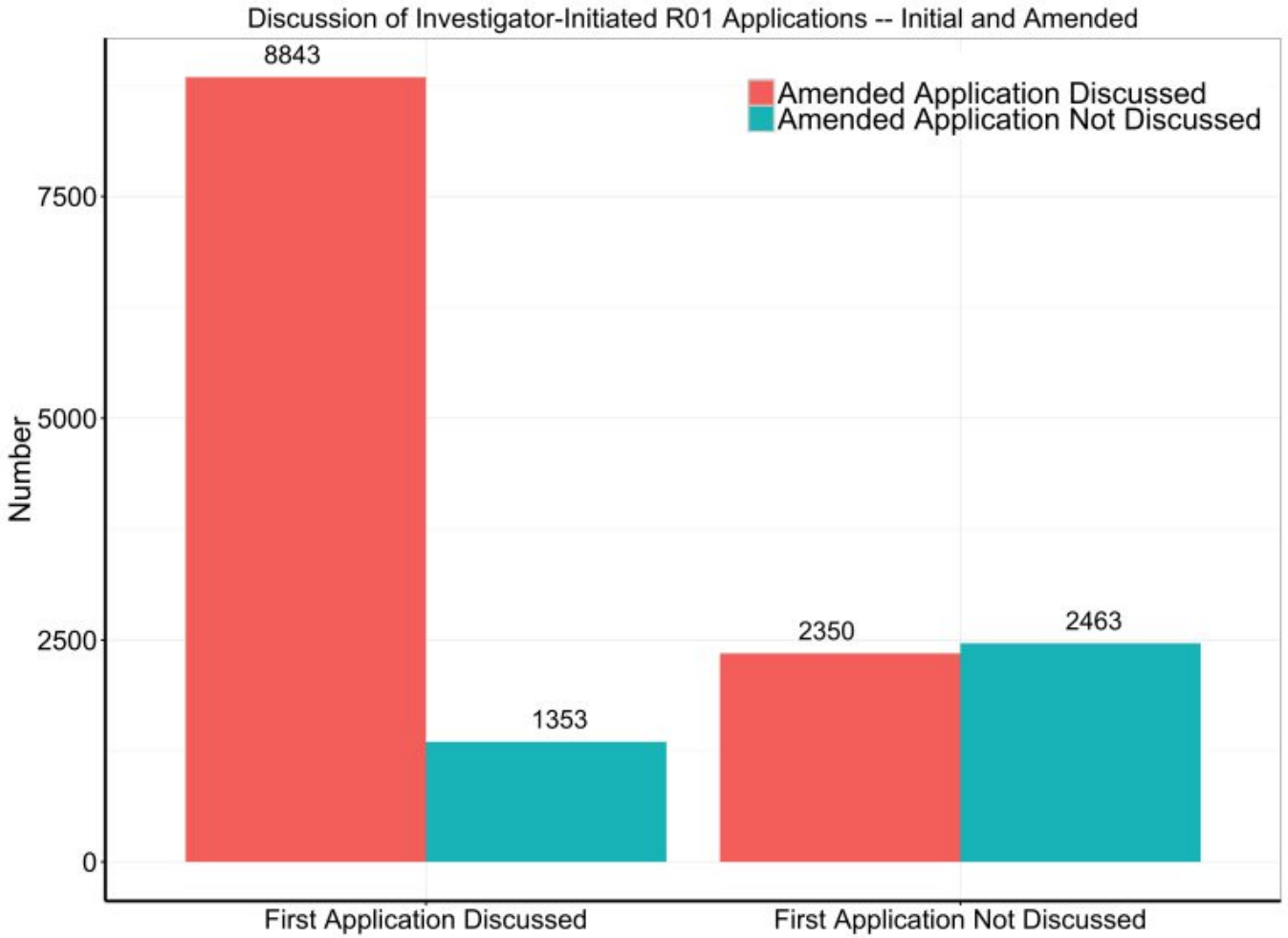
https://nexus.od.nih.gov/all/2017/03/23/outcomes-of-amended-a1-applications/

Analysis of CNAP grant scores



Relationship between A0 and A1 scores

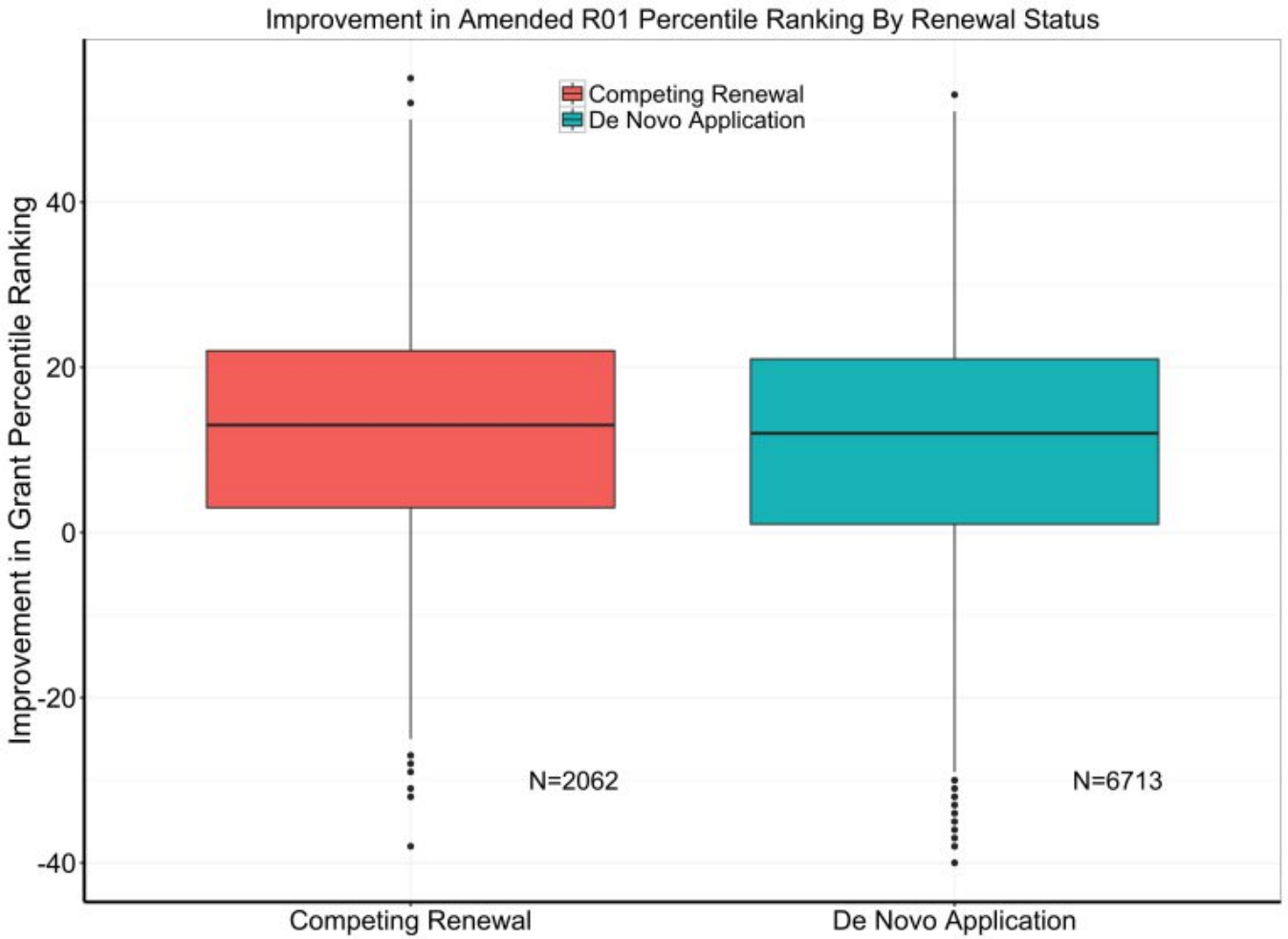
- In 2017, NIH completed an analysis* of the scores of more than 15,000 amended (A1) applications.
- They found that if the initial application was discussed, an amended application was discussed 87% of the time.
- If the initial application was NOT discussed, the odds of an amended application being discussed were just 49%



https://nexus.od.nih.gov/all/2017/03/23/outcomes-of-amended-a1-applications/

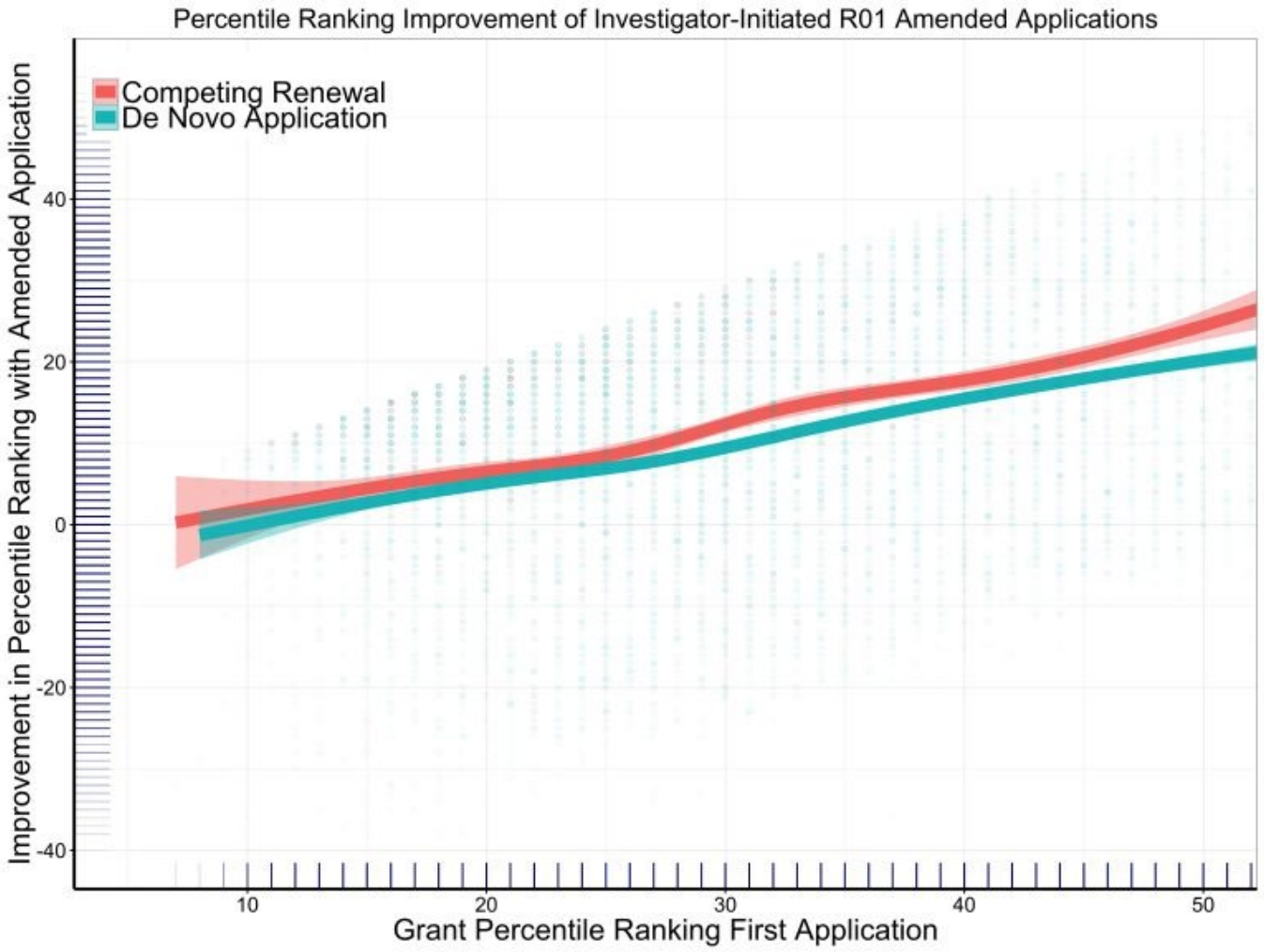
Relationship between A0 and A1 scores

- 75% of amended applications that were discussed in both rounds improved their scores



Relationship between A0 and A1 scores

- The strongest predictor of score improvement, by far, was the initial percentile ranking
- Applications with poorer scores improved the most
- All other candidate predictors were minor



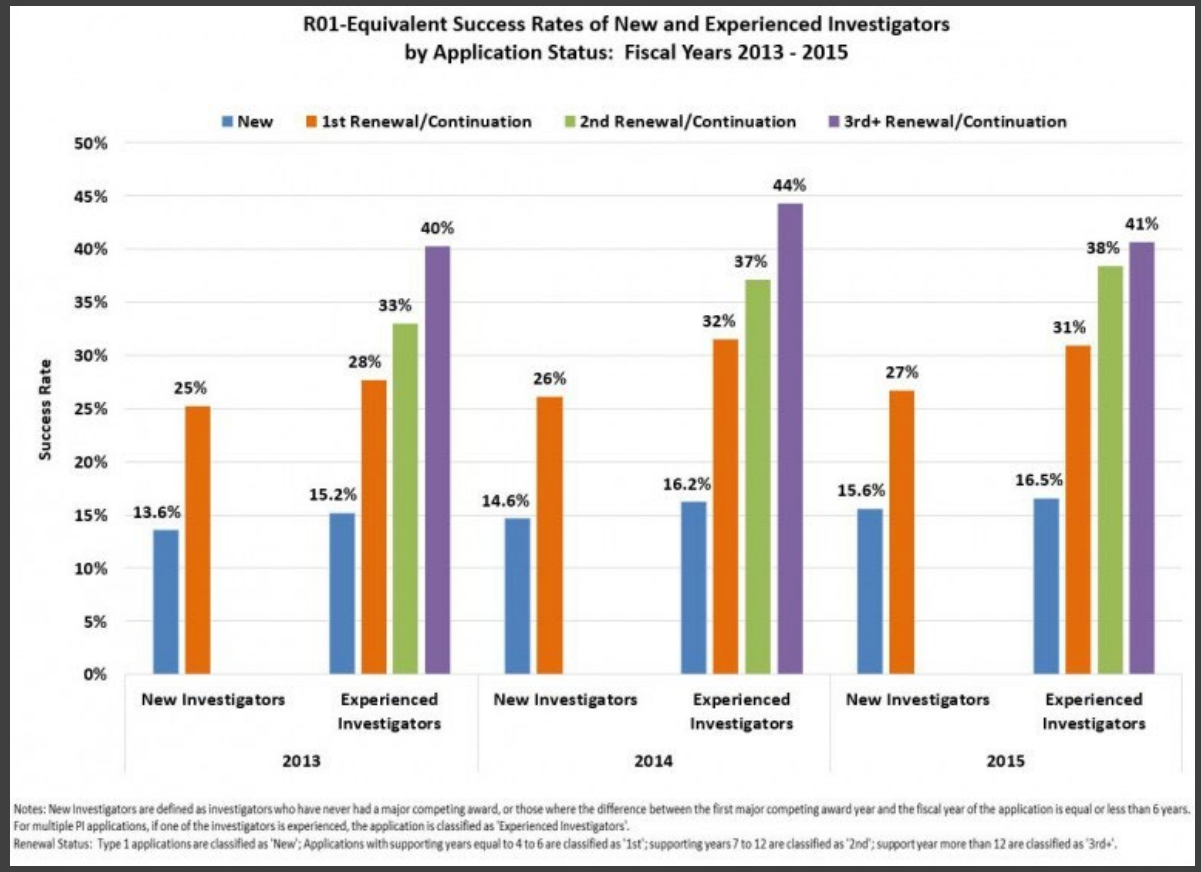
exus.od.nih.gov/all/2018/10/31/what-contributes-to-the-success-of-early-career-scientists-a-niaid-look/

Additional factors that affect success

- Haggerty and Fenton (2018) examined a cohort of R01 (and equivalent) grantees who received their first R01-level award between 2003-2010.
  - They tracked applications and success rates until 2016 or until the investigator's final application (before dropping out)
- 57% of this cohort successfully obtained at least one more R01-level award
- Those who were funded:
  - Scored better on their first R01 application
  - Submitted more applications per year
  - Had a shorter amount of time between their first award and next application
  - Submitted to multiple NIH Institutes
  - Had more renewal application submissions

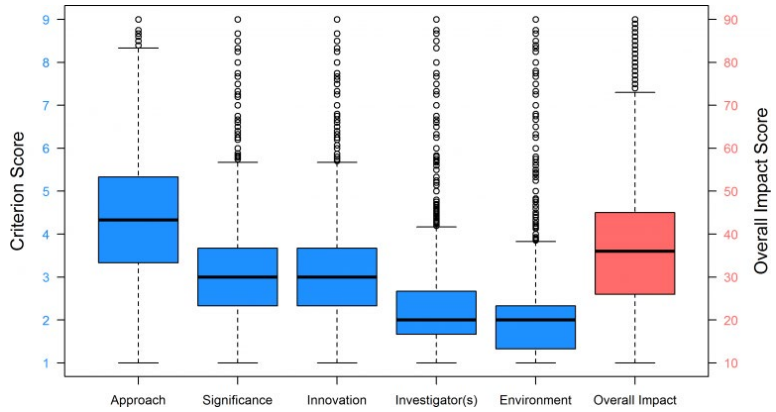
Renewal success rates

- In 2015, NIH gathered data on renewal success rates
- Looked at new investigators vs. established investigators
- New investigators were almost as successful as established investigators in getting a new award funded
- Renewal applications have higher success rates than new applications
  - True for both new and established investigators
- Experienced investigators have escalating success over time

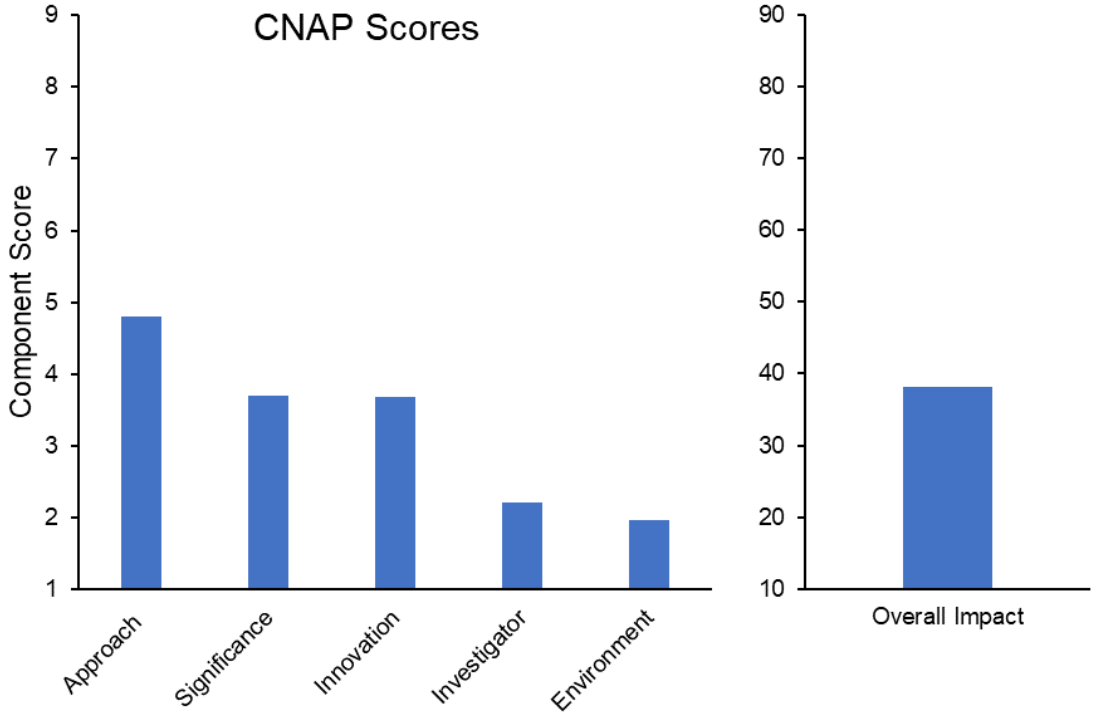


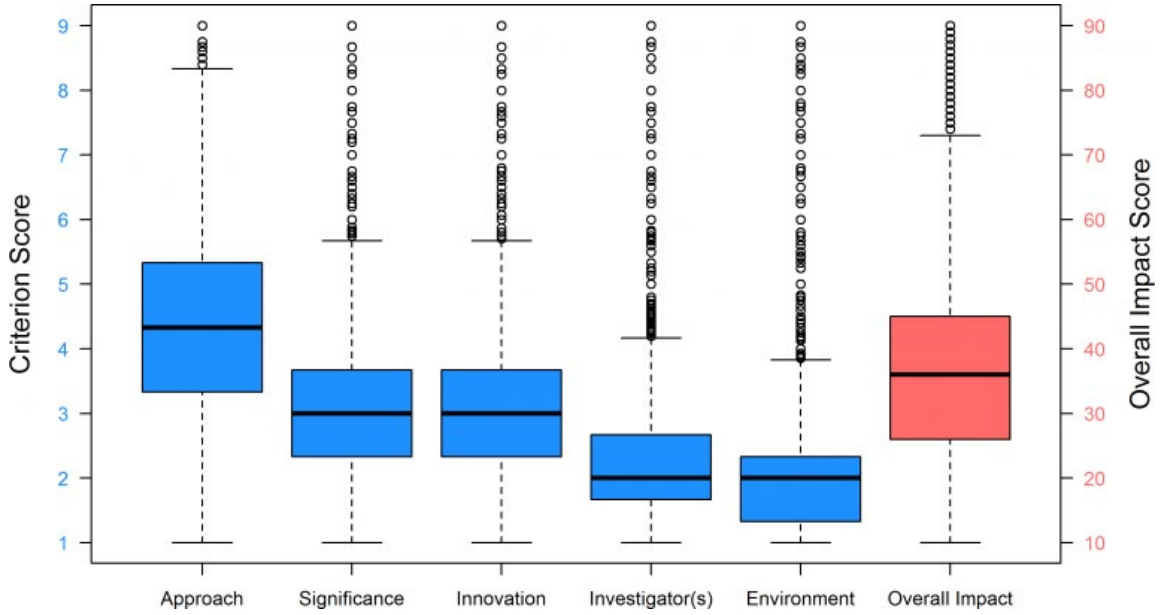
Predictive nature of criterion scores on overall impact score

- A 2016 study found that the approach score was the strongest predictor of overall impact
- The significance score was a close second
- Most grants get better scores for investigator and environment compared to the other criterion scores



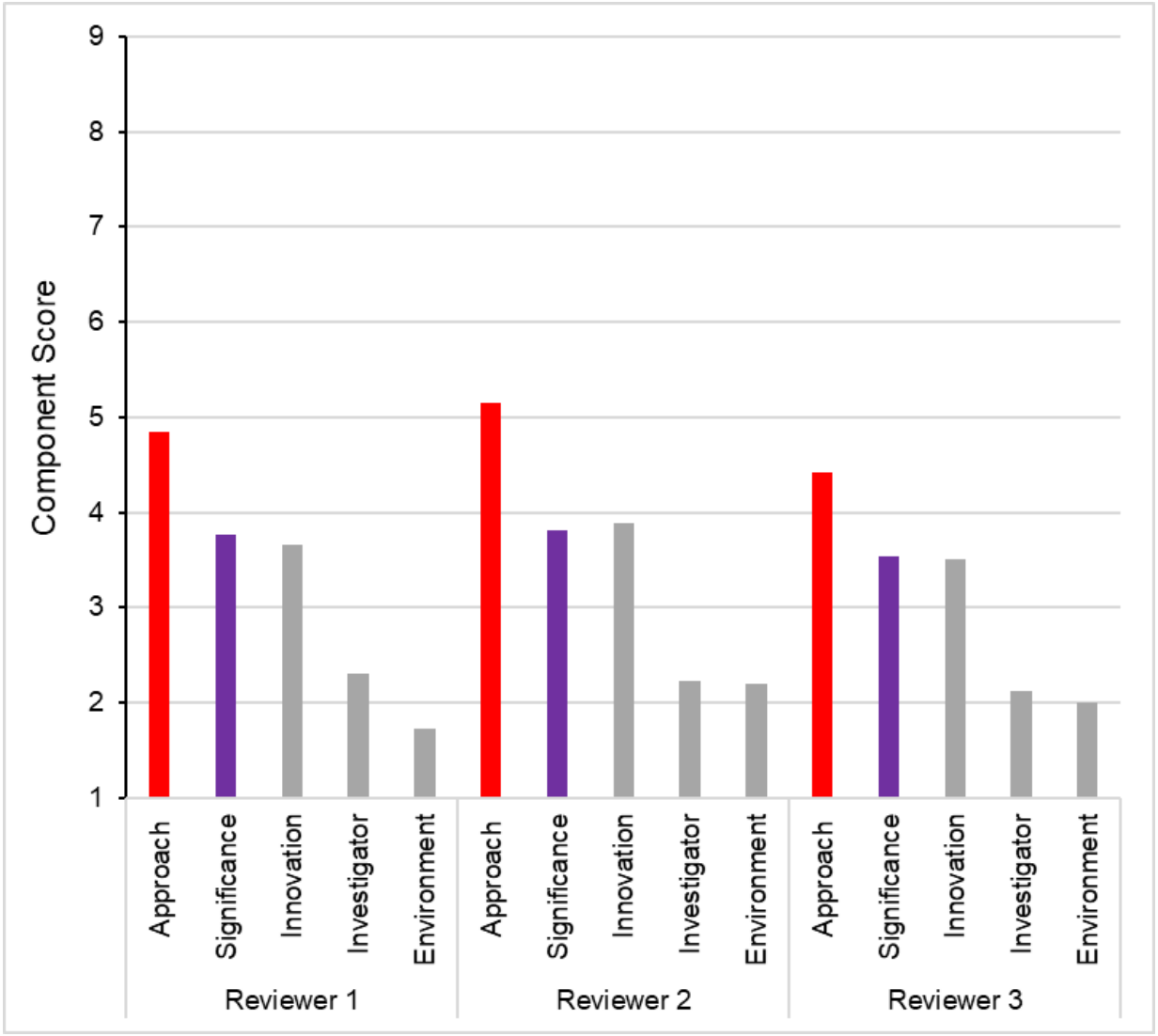
Comparison of NIH vs. CNAP data



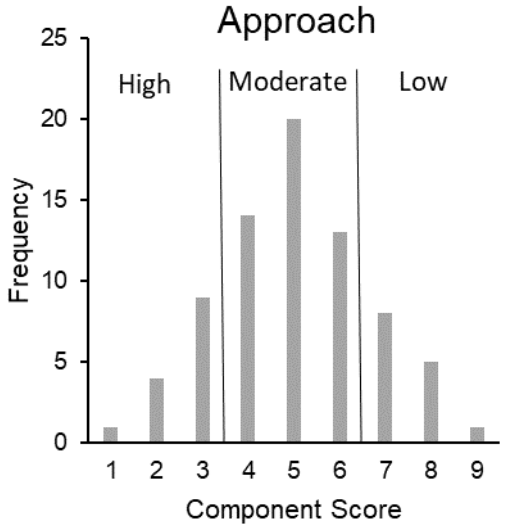


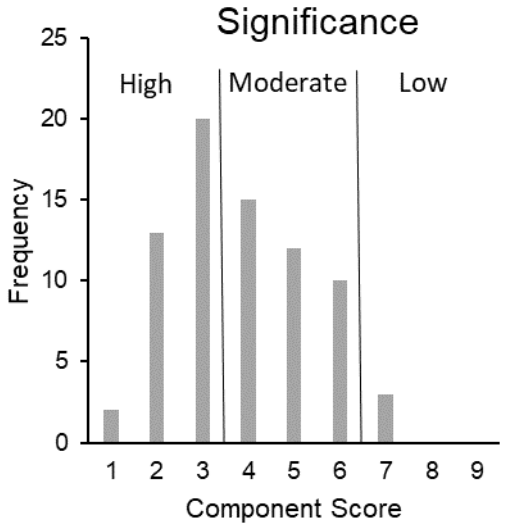
Analysis of component scores by reviewer

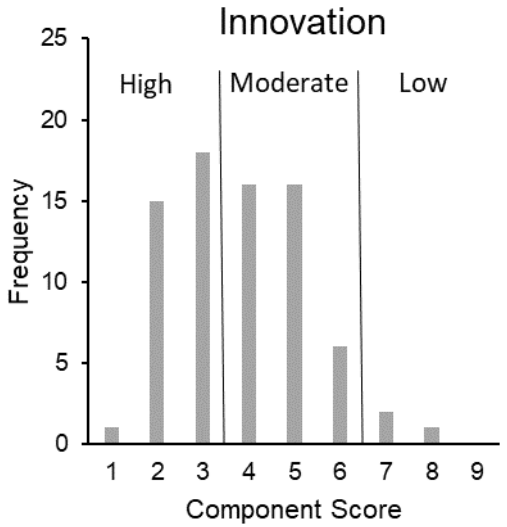
- Analyzing scores by reviewer can be useful
  - Rev 1 and 2 usually are strong experts
  - Rev 3 may be more of a general expert
  - Can see if grants appeal equally well to different reviewer types
- Approach scores were nearly 1 pt worse for Rev 1 and 2
  - Seeking out expert pre-review may help correct issues with approach
  - Remember, that approach scores carry the most weight in the overall impact score

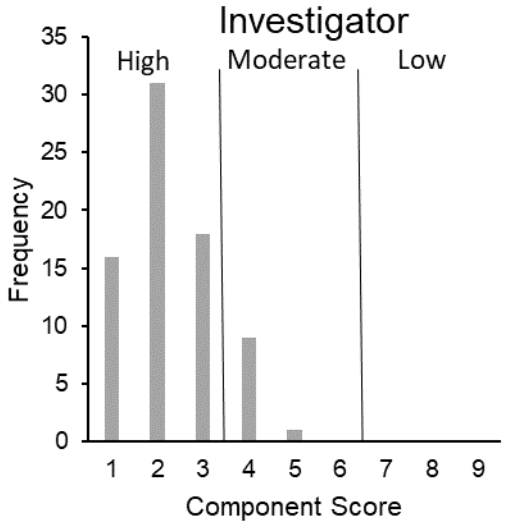


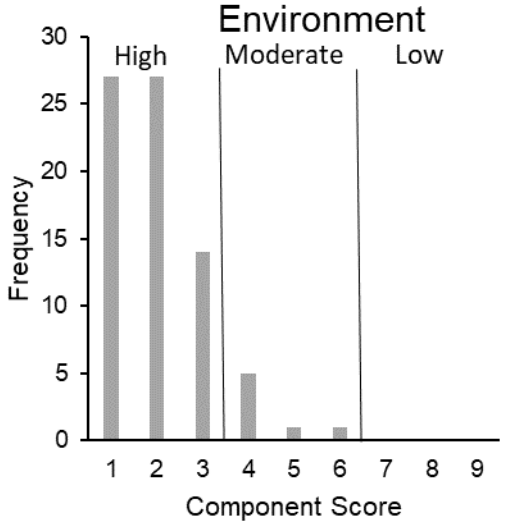
Distribution of component scores











Common Pitfalls in CNAP Proposals

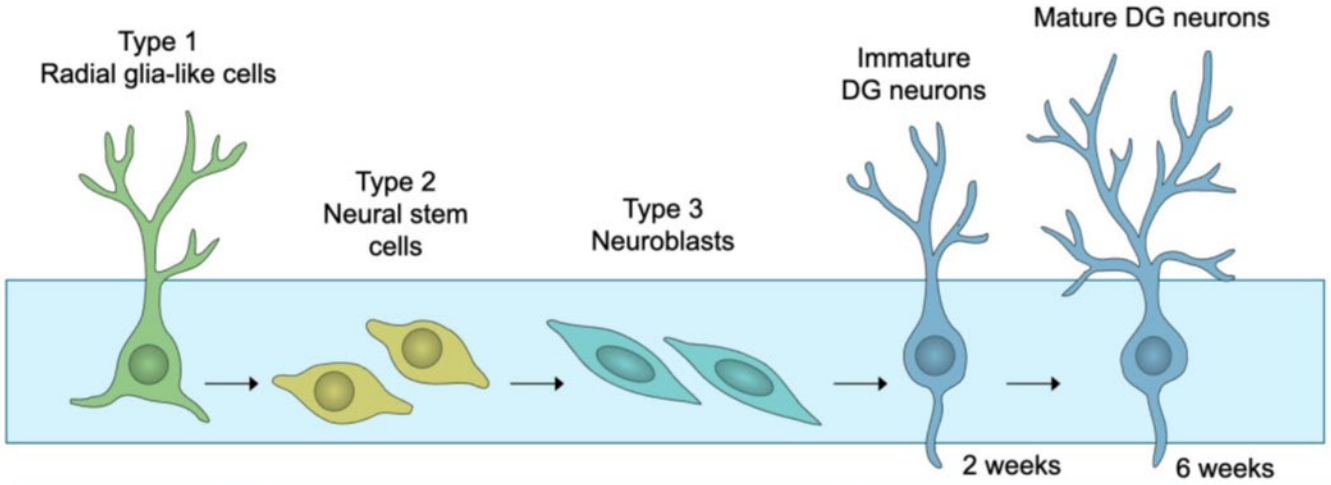
- Working too close to a deadline
- Research team issues
  - Missing expertise
  - Team members not cohesive
- Use of older research technique issues (instead of cutting-edge)
  - Low innovation and approach scores
- Missing components of agency guidelines
  - Potential pitfalls/alternative strategies
  - Sex as a biological variable
  - Power analyses
- Reviewers express confusion / problems with understanding proposal

Ideas for Improvements

- Start early and aim to have a good quality application ready 2-3 weeks before the deadline
- Build a well-constructed team early in the proposal development process
  - Include your team members in your pre-review process
- Take advantage of core facilities, collaborations to increase innovation in your research technique selection
- Check guidelines carefully (Effie can help!)
  - Guidelines can change frequently, so keep appraised of updates
  - Forms H coming January 2023
- Follow good practices in science writing
  - Leave plenty of time to refine and hone the writing
  - Include high quality science illustrations
- Arrange scientific pre-review

Importance of science illustration

- Diagrams that explain your project can be very powerful
- Help reviewers manage the cognitive load on reviewers
- Try to include ~1 figure or table per grant proposal page

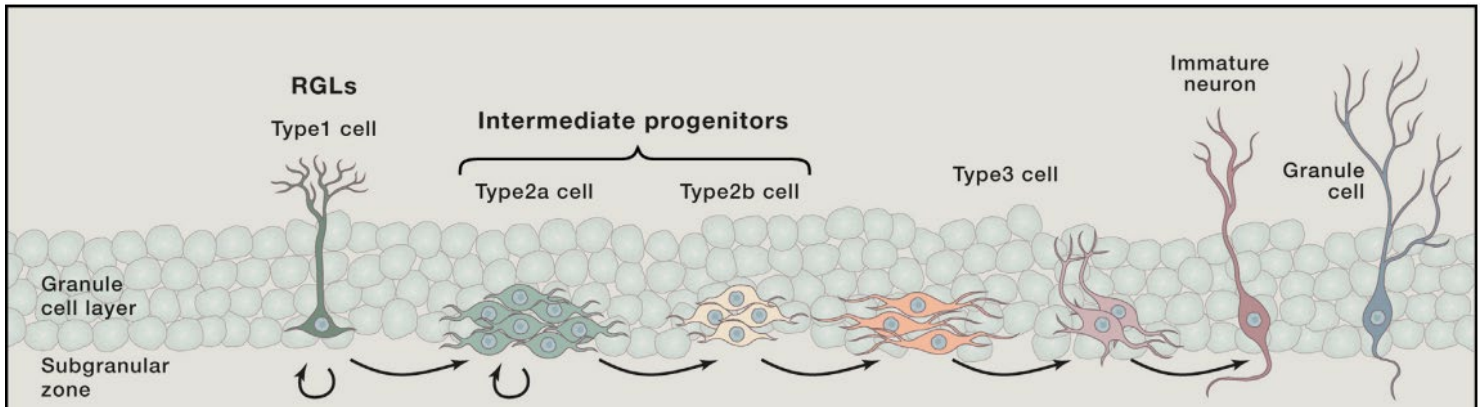


	Proliferation	DCX*	Spine density	Connectivity
Alcohol dependence	↓	↓	↓	↓
Alcohol withdrawl	↑	↑	↑	↑

*Doublecortin expressing cells

Importance of science illustration

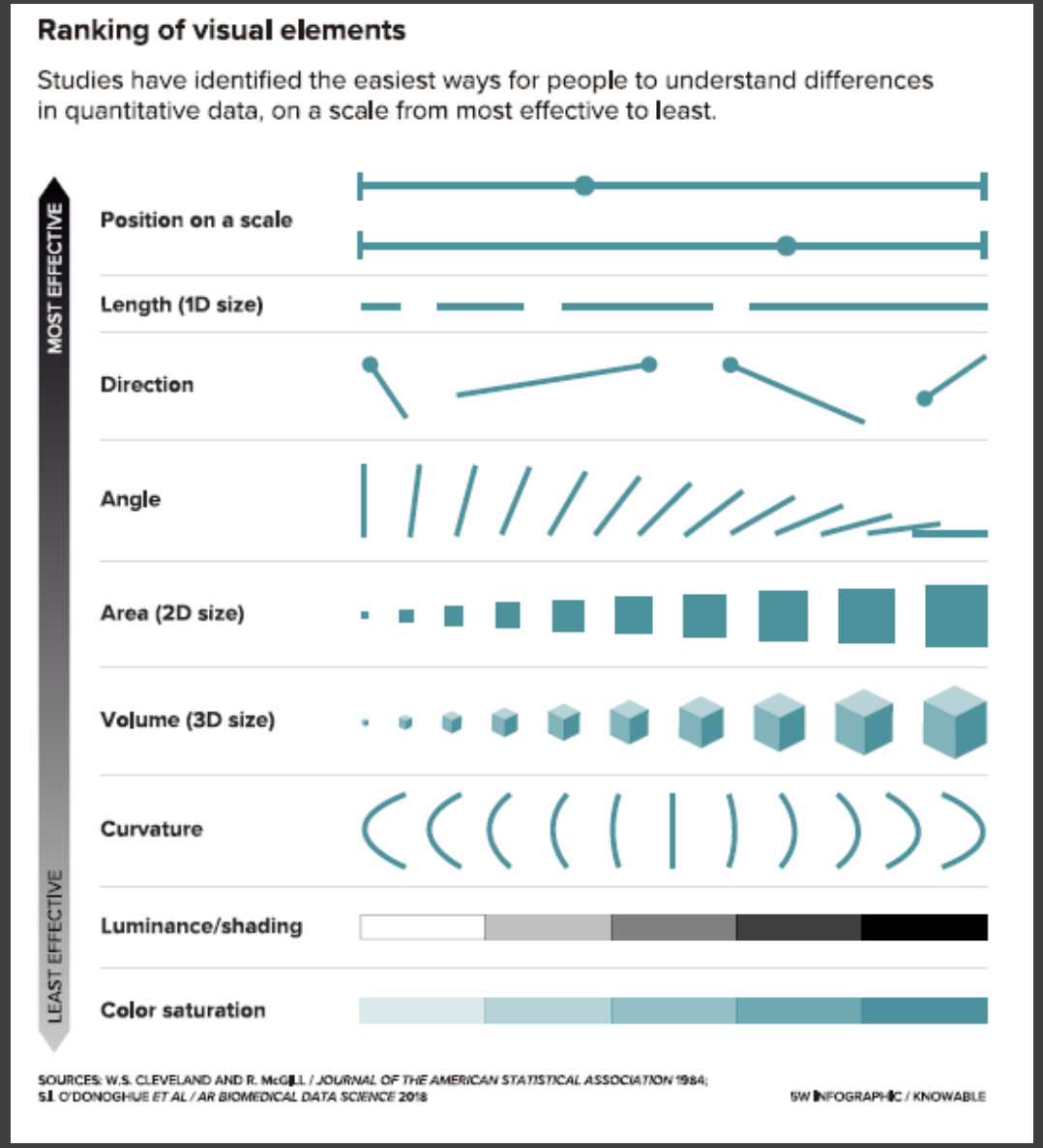
- However, there is a learning curve, so I would not recommend this if you are working to a tight deadline with limited time



	Quiescence	Proliferation/ Activation	Fate specification	Morphogenesis and differentiation	Maturation
Signals	BMP, Notch, GABA	Canonical Wnt, IGF, Shh, FGF-2, EGF, Dopamine	Canonical Wnt, NT-3	Wnt/PCP, Notch, BDNF, Reelin, GABA	Glutamate, NRG2, Neuronal activity
Transcription factors	Hes5, FoxO, REST	Sox2, Tlx	Tbr2, Ascl1/Mash1, NeuroD1, Prox1	NeuroD1,Prox1, CREB, AP-1?	CREB
Epigenetic regulation		Gadd45b, LSD1	Fmrp, Mbd1	Gadd45b, MeCP2	MeCP2, HDAC2

Importance of science illustration

- Mason, B. (2019). Why scientists need to be better at visualization
- Humans are visual creatures by nature
  - Absorb info in graphic form that would elude them in words
  - Effective story telling, specially when dealing with complex material
- Visualizations can reveal patterns, trends and connections in data
  - Can reveal the underlying structure of data that you wouldn't see in tables



Take away messages

- Want to aim for high quality first submissions that will be in the top half
  - Don’t rush grants out the door
  - Don’t submit before your grant is truly ready
- Currently, CNAP are only hitting ~32% of first submissions in top-half
  - Would like to hit >= 50%
- Analysis of score distributions suggests that we are not far off from meeting our top half goal
  - The main issue may be with the expert review scores of approach section
  - Seek out expert pre-review a few weeks before the deadline
- Also, make sure to leave plenty of time for finishing touches in the writing and graphics
  - Aim to include ~1 high-quality figure or table per grant page