# Get your head in the clouds!
## Discover the strengths and weaknesses cited in funded and unfunded grant applications

[1]Thomas, H., [2]Brodsky, M., [1]Bergey, G., [1]Marvel, C.

[1]Department of Neurology, Johns Hopkins University School of Medicine, Baltimore, Maryland, USA
[2]Department of Physical Medicine and Rehabilitation, Johns Hopkins University School of Medicine, Baltimore, Maryland, USA

## Introduction

The success rate of funded grants in FY 2021 was 19.1% for research project grants and 31.9% for career development awards.[1] These low success rates prove that investigators, especially new and early-stage, need all the help they can get when submitting an NIH grant application.

Key words and phrases produced from NIH summary statements of funded and unfunded grants shine light on important aspects of the application that reviewers commonly cite. This poster aims to highlight frequently cited words and phrases reviewers use to describe the grant application. Applicants submitting to the NIH should consider these key words and phrases to help them navigate on the road to funding success, not failure.

## Objectives

- Identify the most commonly used descriptive words and phrases in funded and unfunded summary statements
- Categorize them into strength and weakness categories
- Highlight commonly cited words and phrases in word clouds

## Methods

Summary statements were obtained from applicants who went through the Internal Grant Review Program (IGRP) at Johns Hopkins University, Department of Neurology. Seventeen (17) funded and twelve (12) unfunded grants were obtained and the summary of discussion written by the Scientific Review Officer (SRO) were included in the analysis.

1. Descriptive words and phrases were pulled out and separated into strength and weakness categories.
2. Strengths and weaknesses were included in the word cloud generator called WordArt.com, which produced two clouds, respectively.[2]
3. The words and phrases were further separated into key review criteria categories based on the NIH critique templates for Research Project Grants (RPG's) and Career Development Awards (K's).[3]

## Conclusion

NIH reviewers use the key review criteria, significance and innovation, to assess the project's importance, and use approach, investigator, and environment to assess its likelihood of feasibility and success. Each of the review criteria are scored, and the final score determines the extent to which the project can make an impact. The NIH defines impact as the likelihood the project will exert a powerful influence on its field, and also comment its relevance to the NIH mission: improving human health through science.[4] Our goal is to help new and early-stage investigators develop the best possible grant applications that will have a greater likelihood of getting funded. This work was done to provide a visual representation of what reviewers are saying about the grants they review, and help our new and early-stage investigators focus on the strengths and prevent commonly cited weaknesses, so they have a greater chance of getting funded.

## Results

### Strengths

- excellent and supportive institution;
- dedicated laboratory space;
- world-class research environment;
- research environment is well-suited for the conduct of this work

- mentoring team is outstanding;
- excellent team of investigators / collaborators;
- excellent clinician-scientist role models;
- consultants were likewise regarded as outstanding with complementary expertise

- career development plan is well-conceived;
- outstanding career development plan;
- training plan is well-detailed;
- career development plan was regarded as very strong and a nicely detailed plan;
- logical and cohesive career development plan

- highly innovative studies;
- groundbreaking, relevant and exciting;
- timely and experimentally sound;
- clinically relevant data;
- addresses an important science question;
- high impact beyond the field;
- strong potential for translational significance;
- highly important area of research that has been understudied

- Clear, potentially impactful, hypothesis-driven research plan;
- comprehensive and well-developed;
- exceptionally well-written;
- very strong preliminary data;
- well-defined hypotheses and experimental plans;
- based on a solid premise;
- very responsive to the previous critiques (resubmission);
- project is feasible;
- hypotheses and aims are clearly laid out;
- logical design;
- outstanding level of enthusiasm

- outstanding candidate who is extremely well-trained;
- extremely strong letters of support;
- several recent first-author publications;
- good scientific productivity;
- impressive research skills;
- strong publication record in high-impact journals;
- talented new investigator;
- several awards and independent funding

### Weaknesses

- weak foundation for the candidate's independent phase;
- lacks commitment for independent space

- involvement of the mentors was again unanimously questioned (resubmission);
- distance of one of the mentors and limited interaction were viewed unfavorably;
- co-mentorship plan was described as weak;
- training records of the mentor were not clearly described;
- proposal does not do a good job of outlining advancement of new skills

- career development plan was vastly unfocused;
- lacks details on career development, such as grant writing, personnel management and budgeting, which are needed to better evaluate the career development plan to ensure success;
- concern with the training plan is that it was unclear what they will learn

- unlikely there will be significantly new findings that will advance understanding;
- unclear how generalizability the data will be;
- weaknesses in novelty;
- insufficient discussion on the potential impact;
- weaknesses tempered enthusiasm

- a number of minor concerns reduced overall enthusiasm;
- sample size and power poor calculations were poorly done;
- experimental design lacks sufficient detail;
- many of the original weaknesses remain (resubmission);
- scientific rigor was not well-addressed;
- research plan is still overly ambitious (resubmission);
- poorly developed research plan not supported by preliminary data;
- lack of depth in the analyses

- record of low productivity was considered a potential weakness;
- background knowledge is relatively weak;
- should be more productive;
- only one peer-reviewed research paper is thematically linked to the proposed research;
- first authorships were more limited

This way to YES grant funding

This way to NO grant funding

**Key**
- Candidate/Investigator
- Career Development Plan
- Research Plan/Approach
- Significance, Innovation
- Mentors/Collaborators
- Environment/Institution

References
[1] U.S. Department of Health and Human Services, National Institutes of Health, Office of Extramural Research (2021). Funding: Success Rates. Retrieved November 2, 2022 from https://report.nih.gov/funding/nih-budget-and-spending-data-past-fiscal-years/success-rates.
[2] WordArt.com. Retrieved September 20, 2018 from https://wordart.com/.
[3] U.S. Department of Health and Human Services, National Institutes of Health, Office of Extramural Research (2018). Guidelines, Critique Templates & Review Criteria. Retrieved November 2, 2022 from https://public.csr.nih.gov/ForReviewers/GuidelinesAndTemplates.
[4] National Institute of Allergy and Infectious Disease (2018). Scoring and Summary Statements. Retrieved November 2, 2022 from https://www.niaid.nih.gov/grants-contracts/scoring-summary-statements.