Specific Aims

The Most Important Page

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Overview

- Specific Aims
  - NIH forms and instructions
  - Purpose and Goal
  - Structure
    - Examples
  - Common Mistakes
  - Summary

The Specific Aims Page

- An NIH grant proposal Specific Aims Page
- However,
  - Universal means of presenting a problem and potential solution
  - All grants should have the info requested in the specific aims page, although it might be spread throughout the grant
  - Useful way of formulating/organizing your research plans

How do you find the Specific Aims instructions?

You can search ‘NIH grant forms’

NIH National Institutes of Health
Office of Extramural Research

Grants & Funding
NIH's Central Resource for Grants and Funding Information

Entire Site | Search this Site

eRA | Glossary & Acronyms | FAQs | Help

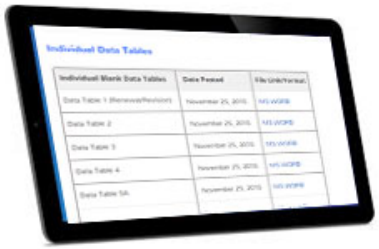
HOME | ABOUT GRANTS | FUNDING | POLICY & COMPLIANCE | NEWS & EVENTS | ABOUT OER

Home » About Grants » Forms Library

- Grants Basics +
- Grants Process Overview
- Plan Your Application
- How to Apply +
- Receipt & Referral
- Peer Review
- Pre-Award and Award Process
- Post-Award Monitoring and Reporting
- Forms Library
- Information For +

Forms Library

A comprehensive inventory of forms, instructions, and format pages for each stage of the grant life cycle. Select the action you would like to take, and we will show you the documents you will need. Already know what you are looking for? Search for the form number or name, or view a table of all forms.



View Table of All Instructions, Forms and Formats

A listing of all forms, formats and instructions grouped by their use. A good option for those experienced with NIH grants.

http://grants.nih.gov/grants/forms.htm

HOME | ABOUT GRANTS | FUNDING | POLICY & COMPLIANCE | NEWS & EVENTS | ABOUT OER

NIH Forms & Applications

Table of All Instructions, Forms and Formats

A listing of all forms, formats and instructions grouped by their use. A good option for those experienced with NIH grants.

On This Page:

Search forms

Competing Grant Applications

Form Name	Form Number	Description	How to Access	Instructions	Additional Information	Updated Date
Grant Application - Standard Form 424 (Research & Related)	SF 424 (R&R)	Use to apply for grants and cooperative agreements.	There is no universal form set available for download. The form set is tailored to each type of grant program and each funding opportunity announcement guides you to the systems through which you can complete the forms (e.g., ASSIST, Workspace, system-to-system solution).  *accessing forms video* Screenshots of the forms are available at the end of the application form instructions, but you must use the forms associated with the FOA for submission.	Instructions for filling out the forms and information on the application process is available on How to Apply – Application Guide.	Annotated forms	September 2017
Public Health Service Grant Application	PHS 398	Use only if specifically requested by NIH.	Instructions: PHS 398 forms.	Instructions: PHS 398 forms.		March 2020

http://grants.nih.gov/grants/forms/all-forms-and-formats.htm

Application Form Instructions

Need help selecting the right instructions?

Application Instructions	Description	SF424 (R&R) - Version E	SF424 (R&R) - Version F
G General Instructions	Comprehensive guidance for research, training, fellowship, career development, multi-project, and small business applications	HTML / PDF	HTML / PDF
Filtered Application Instructions			
R Research Instructions	Guidance for research only	PDF	PDF
K Career Development Instructions	Guidance for career development only	PDF	PDF
T Training Instructions	Guidance for training only	PDF	PDF
F Fellowship Instructions	Guidance for fellowship only	PDF	PDF
M Multi-Project Instructions	Guidance for multi-project only	PDF	PDF
B SBIR/STTR Instructions	Guidance for small business only	PDF	PDF

http://grants.nih.gov/grants/forms/all-forms-and-formats.htm

Specific Aims

The Most Important Page

One page

Follow general directions for font size, margins and spacing

NIH Instructions: State concisely the goals of the proposed research and summarize the expected outcome(s), including the impact that the results of the proposed research will exert on the research field(s) involved.

List succinctly the specific objectives of the research proposed, e.g., to test a stated hypothesis, create a novel design, solve a specific problem, challenge an existing paradigm or clinical practice, address a critical barrier to progress in the field, or develop new technology.

https://grants.nih.gov/grants/how-to-apply-application-guide/forms-d/general-forms-d.pdf

Specific Aims

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https://grants.nih.gov/grants/how-to-apply-application-guide/forms-d/general-forms-d.pdf

Specific Aims

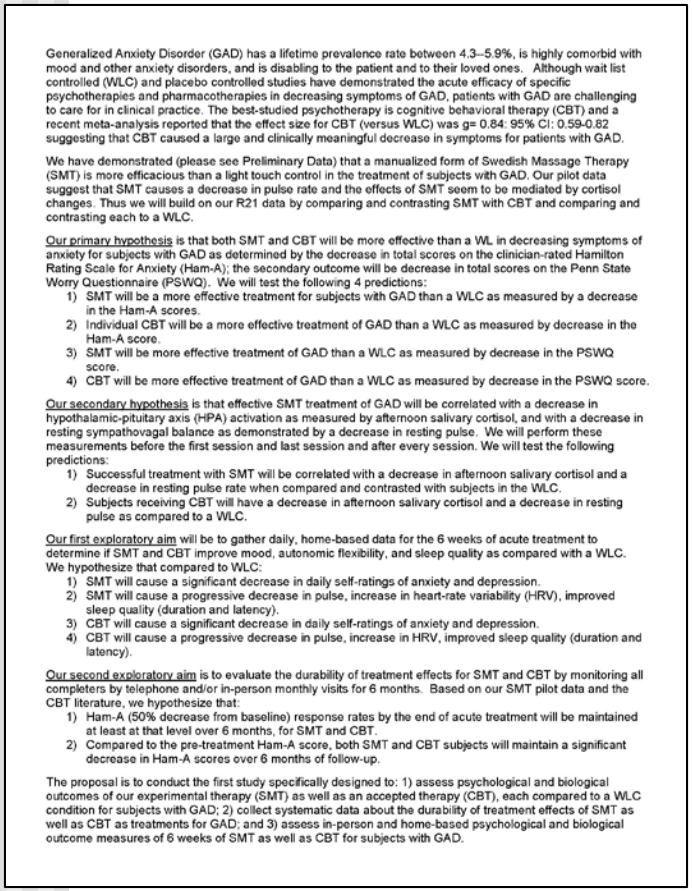
The Most Important Page

(DISCLAIMER: There are no set rules for how to write or format a specific aims page and any resemblance to a rule is purely coincidental: the material presented is intended solely as options/suggestions/clues/hints for a successful aims page, and may be countered at any time by mentors/colleagues/collaborators who have their own – generally strong – opinions regarding the formatting/structure/content of a specific aims page)

There may not be a single correct way, but there are definitely multiple wrong ways

Specific Aims

Example of first impressions



Generalized Anxiety Disorder (GAD) has a lifetime prevalence rate between 4.3--5.9%, is highly comorbid with mood and other anxiety disorders, and is disabling to the patient and to their loved ones. Although wait list controlled (WLC) and placebo controlled studies have demonstrated the acute efficacy of specific psychotherapies and pharmacotherapies in decreasing symptoms of GAD, patients with GAD are challenging to care for in clinical practice. The best-studied psychotherapy is cognitive behavioral therapy (CBT) and a recent meta-analysis reported that the effect size for CBT (versus WLC) was g= 0.84: 95% CI: 0.59-0.82 suggesting that CBT caused a large and clinically meaningful decrease in symptoms for patients with GAD.

We have demonstrated (please see Preliminary Data) that a manualized form of Swedish Massage Therapy (SMT) is more efficacious than a light touch control in the treatment of subjects with GAD. Our pilot data suggest that SMT causes a decrease in pulse rate and the effects of SMT seem to be mediated by cortisol changes. Thus we will build on our R21 data by comparing and contrasting SMT with CBT and comparing and contrasting each to a WLC.

Our primary hypothesis is that both SMT and CBT will be more effective than a WL in decreasing symptoms of anxiety for subjects with GAD as determined by the decrease in total scores on the clinician-rated Hamilton Rating Scale for Anxiety (Ham-A); the secondary outcome will be decrease in total scores on the Penn State Worry Questionnaire (PSWQ). We will test the following 4 predictions:

1) SMT will be a more effective treatment for subjects with GAD than a WLC as measured by a decrease in the Ham-A scores.
2) Individual CBT will be a more effective treatment of GAD than a WLC as measured by decrease in the Ham-A score.
3) SMT will be more effective treatment of GAD than a WLC as measured by decrease in the PSWQ score.
4) CBT will be more effective treatment of GAD than a WLC as measured by decrease in the PSWQ score.

Our secondary hypothesis is that effective SMT treatment of GAD will be correlated with a decrease in hypothalamic-pituitary axis (HPA) activation as measured by afternoon salivary cortisol, and with a decrease in resting sympathovagal balance as demonstrated by a decrease in resting pulse. We will perform these measurements before the first session and last session and after every session. We will test the following predictions:

1) Successful treatment with SMT will be correlated with a decrease in afternoon salivary cortisol and a decrease in resting pulse rate when compared and contrasted with subjects in the WLC.
2) Subjects receiving CBT will have a decrease in afternoon salivary cortisol and a decrease in resting pulse as compared to a WLC.

Our first exploratory aim will be to gather daily, home-based data for the 6 weeks of acute treatment to determine if SMT and CBT improve mood, autonomic flexibility, and sleep quality as compared with a WLC. We hypothesize that compared to WLC:

1) SMT will cause a significant decrease in daily self-ratings of anxiety and depression.
2) SMT will cause a progressive decrease in pulse, increase in heart-rate variability (HRV), improved sleep quality (duration and latency).
3) CBT will cause a significant decrease in daily self-ratings of anxiety and depression.
4) CBT will cause a progressive decrease in pulse, increase in HRV, improved sleep quality (duration and latency).

Our second exploratory aim is to evaluate the durability of treatment effects for SMT and CBT by monitoring all completers by telephone and/or in-person monthly visits for 6 months. Based on our SMT pilot data and the CBT literature, we hypothesize that:

1) Ham-A (50% decrease from baseline) response rates by the end of acute treatment will be maintained at least at that level over 6 months, for SMT and CBT.
2) Compared to the pre-treatment Ham-A score, both SMT and CBT subjects will maintain a significant decrease in Ham-A scores over 6 months of follow-up.

The proposal is to conduct the first study specifically designed to: 1) assess psychological and biological outcomes of our experimental therapy (SMT) as well as an accepted therapy (CBT), each compared to a WLC condition for subjects with GAD; 2) collect systematic data about the durability of treatment effects of SMT as well as CBT as treatments for GAD; and 3) assess in-person and home-based psychological and biological outcome measures of 6 weeks of SMT as well as CBT for subjects with GAD.

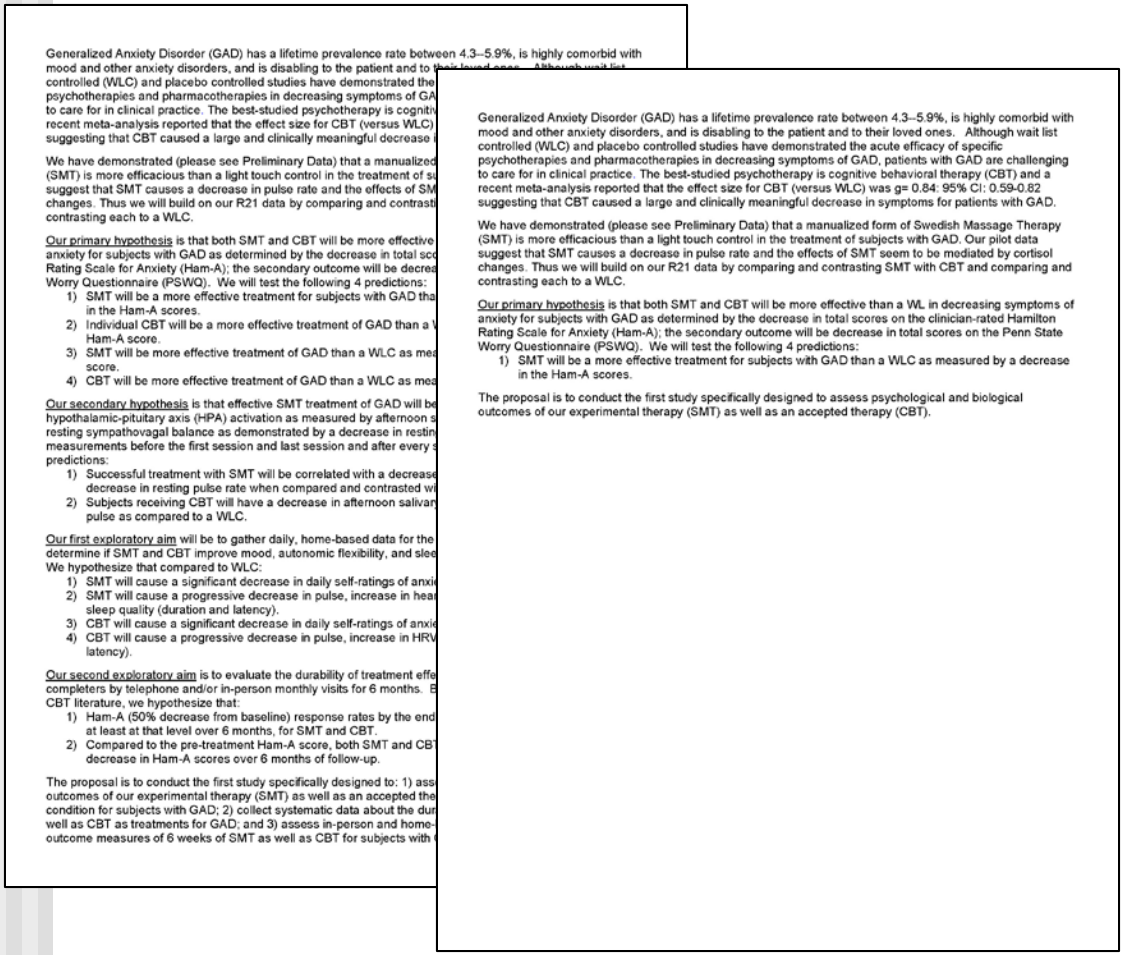
Imagine the reviewer sitting down after dinner and starting to go through the stack of grants they have been assigned to review – They get to this page and without reading they start to make impressions of your grant -

That's an aims page:

- Couple of paragraphs
- Nice spacing, right margins
- Numbered/bullet items
- Summary at the end

Specific Aims

Example of first impressions



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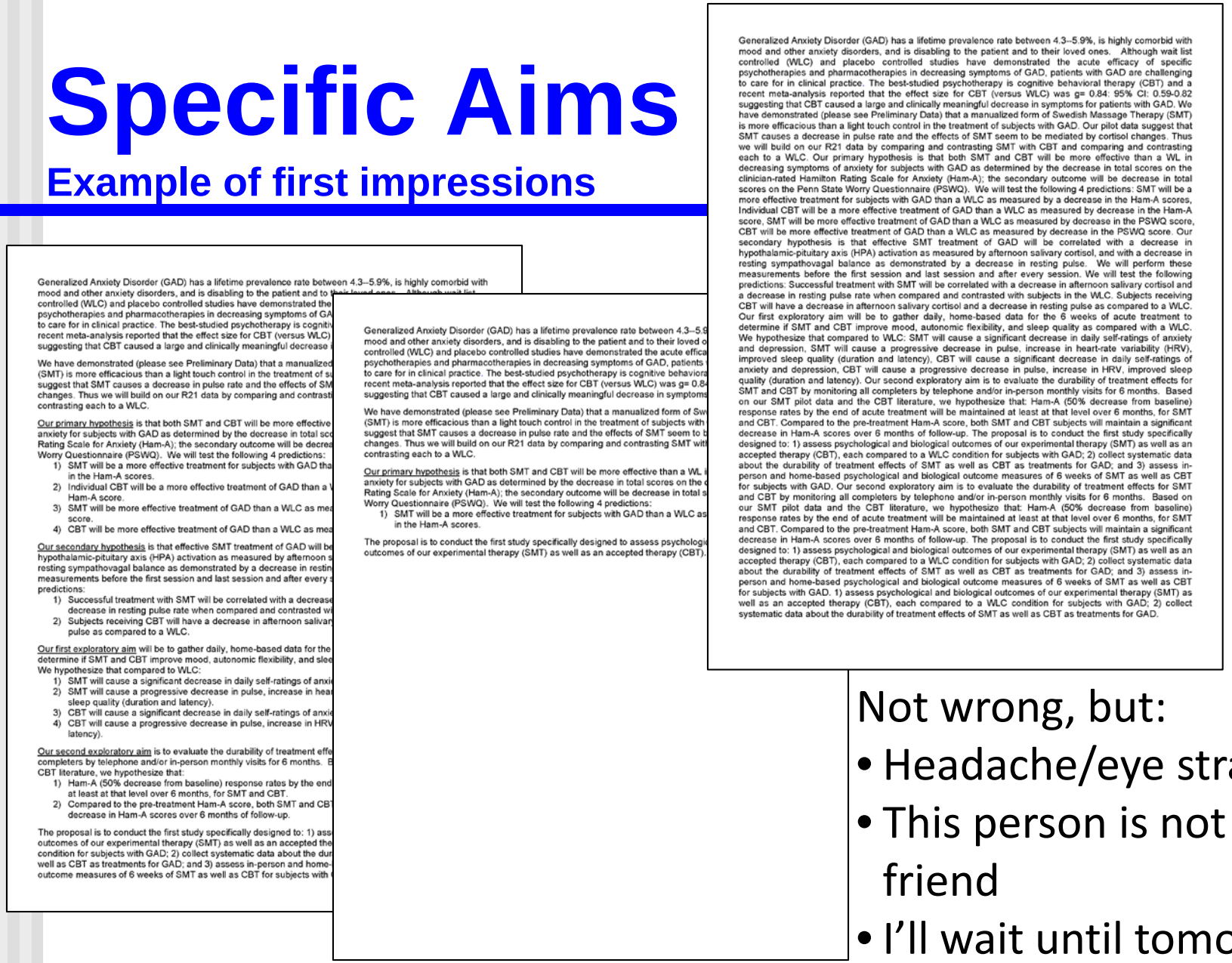
The proposal is to conduct the first study specifically designed to assess psychological and biological outcomes of our experimental therapy (SMT) as well as an accepted therapy (CBT).

Not wrong, but:

- Is that the abstract?
- Very good, or very bad?
- At least I'll get to bed early…

Specific Aims

Example of first impressions



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Not wrong, but:

- Headache/eye strain!
- This person is not my friend
- I'll wait until tomorrow

Specific Aims

Purpose

- Centerpiece/Blueprint/Road Map/Master plan for the rest of grant
- Should include everything about the proposal that is important and exciting - without the detail
- Point the reader in the right direction and set the tone for the rest of the grant
- Engage the reviewer, win them over, provide them with a conceptual framework
- ‘Sell’ your proposal

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Use when contacting program officer for advice on where/what to submit

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Use when introducing your grant to collaborators

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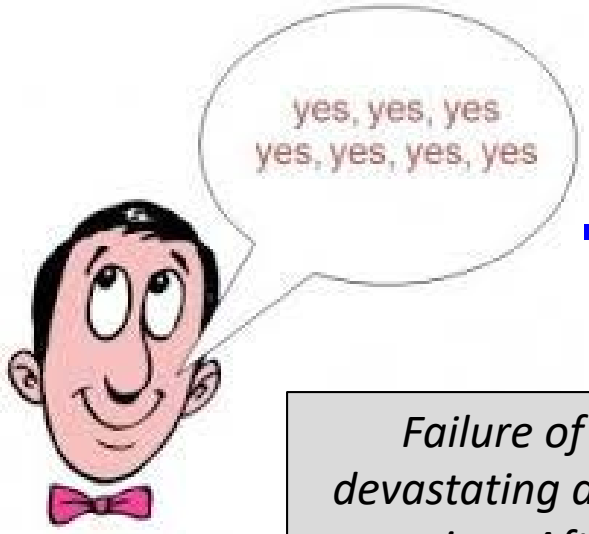
Use when contacting program officer for advice on where/what to submit

Use when introducing your grant to collaborators

This may be the only page of your proposal that a reviewer reads

Specific Aims

Purpose



Reviewer Impression:

- I understand
- This is interesting
- This is important
- I want to advocate

Secondary Impressions:

- This investigator is organized, accurate, clear, logical
- This project is reasonable
- This project has a high probability of success

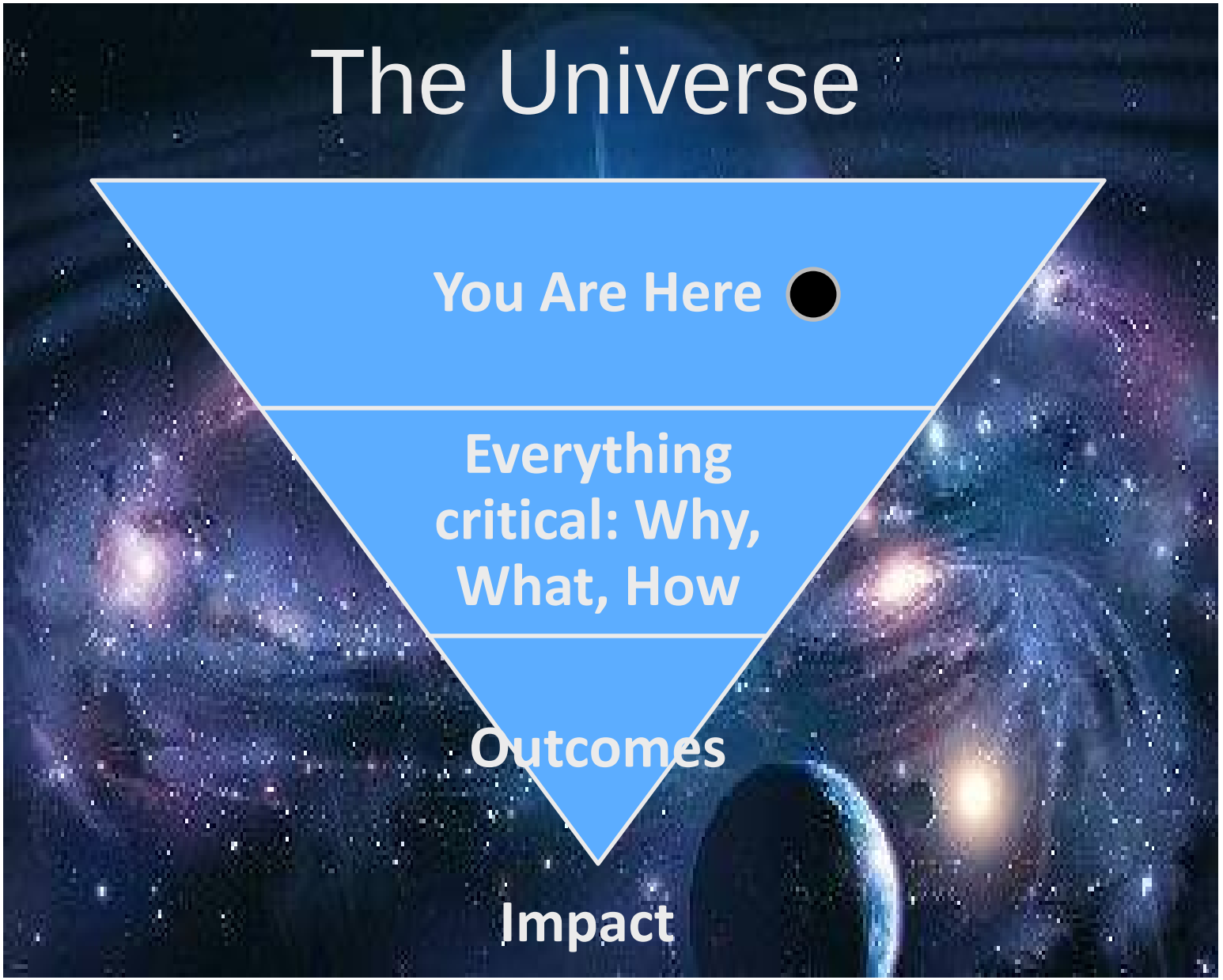
Failure of the Specific Aims has a devastating and cascading effect on the review. After struggling with it, the reviewer goes on to the Background and Significance section. The review of the literature and discussion here may be pertinent but lost on a reviewer who does not understand what the proposal is all about. As reviewers, at this point we usually abandon any attempt to follow a line of logic … All in all, it is very difficult for mere science to overcome such a psychological handicap imposed on the reviewer.

Ogden and Goldberg (2002) Research Proposals: A Guide to Success

Specific Aims

Structure

There is no set structure …


The Universe
You Are Here
Everything critical: Why, What, How
Outcomes
Impact

Major depressive disorder (MDD) is prevalent, debilitating, and costly both to individuals and society. One of the challenges with this heterogeneous syndrome is our inability to identify clinically and biologically distinct subsets of patients and so treatment assignment is fairly arbitrary. A second problem we face is that the majority of antidepressant medications share a common mechanism of action: modulation of monoamine systems. Thus, it is not surprising that the overall remission rate to initial therapy can be as low as 33%. These facts suggest that we should reconceptualize our approach to the treatment of MDD. We need to move toward individualized MDD treatment strategies by identifying more homogenous cohorts of patients who are responsive to specific antidepressant therapies. Omega-3 polyunsaturated fatty acids (n-3 PUFA) are a focus of treatment research for many medical and psychiatric disorders. One rationale that could explain therapeutic benefit across a wide array of syndromes is the observation that increasing n-3 PUFA levels shift the production of eicosanoids away from the arachidonic acid, pro-inflammatory, cascade and toward the production of anti-inflammatory metabolites. And so, individuals who manifest inflammation as a component of their illness might benefit from an n-3 PUFA intervention. Although studies in subjects with MDD suggest that n-3 PUFA may be a beneficial adjuvant therapy with traditional antidepressant medications, most monotherapy trials find, at best, a small effect size benefit for n-3 PUFA in heterogeneous samples of subjects with MDD.

First Paragraph

Work from our previous R-01 identified a homogeneous set of subjects with MDD who were particularly responsive to the n-3 PUFA eicosapentaenoic acid (EPA): subjects with MDD who had multiple biomarkers indicating high inflammation. One clinical characteristic correlated with the presence of high inflammatory markers was obesity (BMI ≥30). In fact, 48% of our obese subjects (vs. 11% in our normal weight group) with MDD had baseline levels of high sensitivity C-Reactive Protein (hs-CRP) ≥3mg/l, the accepted cut-point for defining high inflammation. All of these subjects met criteria for high inflammation on multiple additional markers of inflammation. The overall aim of this application is to extend our previous findings by performing a definitive clinical trial: We propose a 150-subject, two-site, 8-week double-blind randomized trial investigating the efficacy of a 1000 mg/day of EPA-enriched PUFA monotherapy vs. placebo in subjects with MDD, obesity, and baseline levels of hs-CRP ≥3mg/l. We will test 1 primary hypothesis, 2 mediator hypotheses, and 2 exploratory hypotheses:

Second Paragraph

1. Specific Aim 1 (Primary Aim): To investigate the efficacy of 1000 mg/day of EPA-enriched PUFA as a monotherapy for obese subjects with MDD who manifest signs of inflammation:
   a. *We hypothesize that obese subjects with baseline hs-CRP levels ≥3mg/l and MDD who are treated with EPA will have a significantly greater decrease in Inventory of Depressive Symptoms-Clinician rated 30 item (IDS-C30) scores than subjects receiving placebo.*
   b. *Secondarily, we hypothesize that obese subjects with baseline hs-CRP levels ≥3mg/l and MDD who are treated with EPA will have significantly higher rates of remission and response as measured by IDS-C30, and a significantly higher rate of improvement on the CGI-Improvement scale than subjects receiving placebo.*
2. Specific Aim 2: To investigate the role that the anti-inflammatory effect of EPA plays in mediating its antidepressant response: *We hypothesize that response to EPA will be mediated by a decrease in proinflammatory cytokine/adipokine production as measured by a decrease in hs-CRP, Tumor Necrosis Factor-alpha (TNF-α), Interleukin-6 (IL-6), Interleukin-1 receptor antagonist (IL-1ra), and leptin, and an increase in adiponectin (an anti-inflammatory marker) levels at weeks 4 and 8.*
3. Specific Aim 3: To investigate the relationship between increased n-3 PUFA levels and a decrease in inflammatory biomarkers. *We hypothesize that the decrease in proinflammatory cytokines and the increase in the anti-inflammatory cytokine (adiponectin) in the EPA group will be correlated with increased levels of n-3 fatty acids in red blood cell membranes at weeks 4 and 8.*
4. Specific Aim 4 (Exploratory Aims): To explore the relationship of EPA response to specific clinical features of this cohort: *Based on our preliminary data and the literature we hypothesize that:*
   a. *Fatigue, anhedonia, concentration, hypersomnia, disrupted sleep, appetite change, hypochondriasis and somatic symptoms will be highly endorsed (compared to other symptoms) and will improve more with EPA than placebo treatment.*
   b. *There will be a high prevalence of early life trauma, high levels of current stress, and high levels of anxiety in this sample and each of these will serve as moderators of response.*

Aims

Successful completion of this R-01 will have significant public health consequences: (1) we will identify a cohort of patients with MDD who are more likely to respond to treatment with a relatively benign natural product; (2) we will provide the first test of one potential mechanism responsible for n-3 fatty acids' antidepressant effect; and (3) we will have advanced the concept of personalized medicine in the field of psychiatry.

Summary/Impact

Specific Aims – Structure
Paragraph 1

- **Opening Sentence**
  - Orient in the universe
  - Should get the reader's attention
  - Typical to address the mission of the agency (eg. NIH = health, NIMH = mental health)
- **Current Knowledge**
  - State what is know about issue *(It is well known that…)*
- **Gap or unmet need**
  - State what is unknown (*However, it is unknown/unclear/undetermined …)*
- **Why important to address gap or unmet need**
  - *Addressing this issue will…*
  - *The lack of understanding of this issue prevents…*

Specific Aims – Paragraph 1 -example

Behavioral evidence across species suggests that oxytocin (OT) plays a general role in many aspects of social motivation and cognition. However, our understanding of the neurobiological substrates through which it acts at the neural circuit level is far from complete. While we know that intranasal OT enhances many facets of prosocial behavior in humans, we do not yet fully understand how it leads to the modulation of limbic neural activity that could be responsible for this. In the case of social motivation, an intriguing but untested idea is that OT allows for the neural processing of social cues to gate activity in brain areas involved in seeking reward. Investigating such questions at the neuronal level in humans though is not feasible, since it requires invasive methods. *Instead, in this Project, we propose using rodent models to test hypotheses about OT's function and dysfunction in modulating limbic neural activity and functional connectivity during social behavior, since rodents offer an exceptional opportunity to monitor neural activity* in vivo *during natural social interactions.*

Orient the reviewer

Current Knowledge

Gap or unmet need

Why important to address gap or unmet need

Specific Aims – Paragraph 1 -example

Major depressive disorder (MDD) is prevalent, debilitating, and costly both to individuals and society. One of the challenges with this heterogeneous syndrome is our inability to identify clinically and biologically distinct subsets of patients and so treatment assignment is fairly arbitrary. A second problem we face is that the majority of antidepressant medications share a common mechanism of action: modulation of monoamine systems. Thus, it is not surprising that the overall remission rate to initial therapy can be as low as 33%. These facts suggest that we should reconceptualize our approach to the treatment of MDD. We need to move toward individualized MDD treatment strategies by identifying more homogenous cohorts of patients who are responsive to specific antidepressant therapies. Omega-3 polyunsaturated fatty acids (n-3 PUFA) are a focus of treatment research for many medical and psychiatric disorders. One rationale that could explain therapeutic benefit across a wide array of syndromes is the observation that increasing n-3 PUFA levels shift the production of eicosanoids away from the arachidonic acid, pro-inflammatory, cascade and toward the production of anti-inflammatory metabolites. And so, individuals who manifest inflammation as a component of their illness might benefit from an n-3 PUFA intervention. Although studies in subjects with MDD suggest that n-3 PUFA may be a beneficial adjuvant therapy with traditional antidepressant medications, most monotherapy trials find, at best, a small effect size benefit for n-3 PUFA in heterogeneous samples of subjects with MDD.

Orient the reviewer

Current Knowledge

Gap or unmet need

Why important to address gap or unmet need

Specific Aims – Structure

Paragraph 1 – Tips

Find a paragraph that you like

Identify the sentences that perform the following functions:

- **Orienting the reviewer**
- **Current Knowledge**
- **Gap or unmet need**
- **Why important to address the gap or unmet need**

Structure your paragraph in the same way

OR

Create an outline of your paragraph following the same 4 topics

Specific Aims – Structure
Paragraph 2

What, Why, Who

- **Long-term Goal** Should clearly encompass the gap *(Our long-term goal is to….)*
- **Overall objective** This is the next step to achieve the long-term goal *(The overall object of this application is to ...*)
- **Central hypothesis** understandable, testable, adequately supported, provides focus, directional, testing the central hypothesis will achieve the objective
- **Rationale** that underlies the proposed research, should convey what will be possible after completion of the proposal, and is not possible now

What is a hypothesis?

"A tentative explanation for an observation, phenomenon, or scientific problem that can be tested by further investigation."

Hypotheses are tested, not proven

Characteristics of a good hypothesis

- Important
- Focused, precise
- For an NIH grant:

  Hypothesis that increases understanding of biologic processes, diseases, treatments, or prevention

Example of a good research hypothesis:

Analogs to chemokine receptors can inhibit HIV infection

Examples of inappropriate hypotheses:

Analogs to chemokine receptors can be biologically useful

A wide variety of molecules can inhibit HIV infection

Specific Aims –Paragraph 2 - example

Our *long-term goal* is to elucidate how OT modulates the neural systems underlying social information processing and social reward to enhance social motivation. We focus here on oxytocin receptor (OXTR) rich regions at a key intersection between these systems: the basolateral amygdala (BLA), a site for multimodal integration of salient sensory cues, and the nucleus accumbens (NAcc), the limbic-motor interface that is critical for reward-seeking behavior. The *objective here* is to record from chronic electrode implants within these regions during behavioral paradigms that exploit the equivalent of social motivation in rodents, namely social approach. Our *central hypothesis* is that the motivation to interact socially is determined by a balance between positive and negative valence cues, and that OT acts to enhance how positive valence cues and/or suppress how negative valence cues modulate the functional neural connections between cue and reward processing areas, thus facilitating social motivation. The *rationale* for our proposal is that, once we know how OT affects functional connectivity between these areas in natural social contexts, our improved knowledge about OT's sites of action will enable better targeted OT-based therapies to ameliorate social deficits. Here, we pursue this with two complementary *specific aims* in two distinct rodent models that are each optimized to address the positive and negative valence aspects of our hypothesis.

What, Why, Who

- **Long-term Goal**
- **Overall objective**
- **Central hypothesis**
- **Rationale**

Specific Aims – Structure

Aims

- How many: 2-4
- Broad and written in such a way that regardless of outcome, aim is achieved
- Link back to the central hypothesis
- Convey why research is being done, what you hypothesize, how you will determine
- Format Option 1
  - Specific Aim 1: (*To determine, to identify, to evaluate…)*
    - *Rationale*
    - *Our working hypothesis is…*
    - *To test this hypothesis, we will...*
  - Format Option 2:
    - *Challenge*
    - *Approach*
    - *Impact*

Specific Aims – Structure

Aims - example

1) Determine whether *blocking* OT action to *impair* the formation of a partner preference in a prairie vole model of social bonding *decreases* functional neural connectivity between BLA and NAcc. The prairie vole social bonding model is a prototype for studying neural activity during social information processing of positive valence cues from a preferred partner. To reveal OT's endogenous role in this, we will block central OXTR with a selective intracerebroventricular antagonist during the initial period of cohabitation when a bond would normally be formed. We *hypothesize* that the OT antagonist will both impair pair bond formation as well as disrupt the neural coherence between BLA and NAcc. We further hypothesize that the disruption will be greater in an animal group with naturally high compared to low NAcc OXTR expression, thereby implicating a specific contribution of OT acting within the NAcc on neural coherence and social motivation.

Broad and written in such a way that regardless of outcome, aim is achieved
Link back to the central hypothesis
Convey why research is being done, what you hypothesize, how you will determine

Specific Aims – Structure
Final Paragraph

- **Payoff** (*These aims will yield the following expected outcomes...*)
- **Impact** (*These outcomes are expected to have an important positive impact because...*)
- Develop advocacy with reviewers who do not read the rest of the proposal
- Demonstrate advancement of the field and contribution to the mission
- Optional: highlight **qualifications of the team**

Specific Aims

Structure can vary

Eg. Submission to a specific RFA/PA

If the RFA is for a specific topic and all of the reviewers know the topic and specific requests made in the PA, the information provided can be more to the point

This R21 proposes to investigate the biological and therapeutic effects of Swedish Massage Therapy (**SMT**) for cancer-related fatigue (**CRF**), in response to PA-10-210, "The Biology of Manual Therapies." An homogenous group of breast cancer survivors with CRF will be randomized to one of three conditions: 6 weeks of SMT, 6 weeks of Light Touch (**LT**), or a 6 week wait list control (**WLC**) condition. Our primary hypothesis is that SMT will ameliorate symptoms of CRF more than LT or WLC. Our secondary hypothesis is that SMT will ameliorate CRF by decreasing inflammatory immune activation, as indexed by circulating concentrations of key pro- and anti-inflammatory cytokines. Our main exploratory hypothesis is that a decrease in CRF will increase quality of life (**QOL**) among cancer survivors. Other exploratory aims will address the role of credibility, expectancy, and preference in treatment outcome, the sustained action of SMT and LT on CRF and immune function, and the value of adding a WLC condition. This exploratory/developmental R21 will provide important preliminary data about the biological impact of SMT and LT in a specific subgroup of breast cancer survivors, with results forming the basis for a future R01. The goals of this project are consistent with the 3 overarching strategic objectives of the 2011 strategic plan for the National Center for Complementary and Alternative Medicine (**NCCAM**): advancing the science of symptom management, identifying personalized approaches to treatment, and helping to shape the appropriate integration of a complementary and alternative medicine (**CAM**) intervention into cancer therapy.

Primary Aim: To conduct a feasibility study to determine whether a 6-week SMT intervention can decrease CRF, as measured by the Multidimensional Fatigue Inventory (**MFI**), among breast cancer survivors who have received both radiation and chemotherapy and have CRF. We hypothesize that SMT will decrease fatigue more than LT or WLC as assessed by the MFI.

Secondary Aim: To determine whether the hypothesized decrease in CRF is due to SMT modulating the immune system of subjects with CRF to decrease chronic inflammation.

We hypothesize that:

a) SMT will cause a decrease in plasma concentrations of pro-inflammatory cytokines (IL-1β, IL-1Ra, IL-6, sIL-6R, TNF-α, sTNFR, IFN-γ), hsCRP and an increase in the anti-inflammatory cytokine (IL-10) more than LT or WLC.
b) SMT as compared to LT or WLC will cause a decrease in pro-inflammatory cytokines and an increase in anti-inflammatory cytokines as measured in an *in vitro* mitogen-stimulation assay.
c) A decrease in plasma pro-inflammatory cytokines, hsCRP and an increase in plasma anti-inflammatory cytokines will mediate the decrease in fatigue as assessed with the MFI.

Exploratory Aims:

1. To explore the relationship between measures of fatigue and QOL as assessed by the MFI and the Patient–Reported Outcomes Measurement System (**PROMIS**).
2. To explore the relationship between the decrease in CRF caused by SMT or LT and pre-treatment credibility, expectancy, and preference scores.
3. To gather preliminary data about the sustained actions of SMT and LT on CRF and immune function by measuring MFI scores and immune function 6 weeks after cessation of the intervention.
4. To analyze the within-subject effects of SMT versus WLC on immune function and fatigue scores for subjects initially randomized to the WLC, and to compare and contrast their change during SMT to that of the groups receiving SMT or LT during the first 6 weeks of the study.

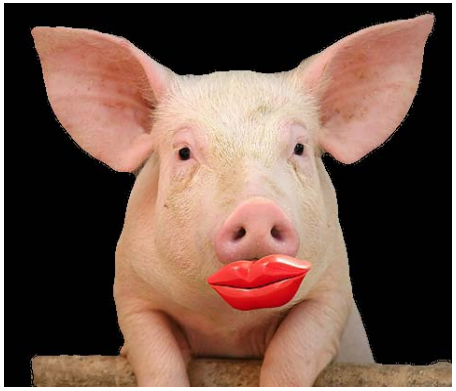
Specific Aims

Frequently debated options

- References – you can add them, but they're not necessary
- I/we/my/our – you can use any of these, or use third person, just be consistent.
- **Bold**/*italicizing*/<u>underlining</u> - Definitely, but use them sparingly
- Justification (margins) – Full justification looks nice from a distance, but is hard to read.
- To hypothesize or not to hypothesize
  - Every project has a purpose, not all projects have a hypothesis
    - Observational, exploratory, hypothesis generating, database, resource, etc

Specific Aims

Common mistakes



Good writing cannot disguise a weak idea, but poor writing can obscure a great idea

- Poorly written: A good idea is necessary, but not sufficient
- Errors (spelling/grammar/cutting/pasting)

Specific Aims

Common mistakes - Jargon

Technical terms can make communication more efficient when a group understands the meaning, but they may create barriers when interacting with laypeople or researchers outside of your field. Using jargon can make your message unintelligible, or even worse, make you seem insincere.

- Write for a scientist not in your field
- Don't write down, write clearly

Example:

We will use *topologic simulation models* to evaluate the effect of stresses on *hydrologic systems*. These models will allow us to predict the *fate and transport* of pollutants under various conditions.

Versus

We will use simulation models based on local topography and other watershed characteristics to evaluate the effect of stresses such as the amount of precipitation or ground-water extraction rates on watersheds and river basins. These models will allow us to predict where pollutants will travel under various conditions.

http://graduatecommunication.blogspot.com/2010/06/communications-tip-simplifying.html

Specific Aims

Common mistakes - Misdirection

Reviewers assume that all of the information provided in the specific aims is important and has meaning for what is to come in the proposal

> Behavioral evidence across species suggests that oxytocin (OT) plays a general role in many aspects of social motivation and cognition.

In this example –

- The proposal should involve behavior, or should provide information in contrast to behavior (eg. However, molecular studies fail to support…)
- The proposal should have something to do with oxytocin
- The proposal should be investigating social motivation and cognition. If it's only social motivation, then cognition should not be mentioned.

Specific Aims

Common Mistakes – Insecure/Unsure/Don't believe

'We hope to be able to potentially demonstrate that estrogen might modulate…'

vs

'Completion of this project will demonstrate the role of estrogen in the modulation of…'

Specific Aims

Common mistakes

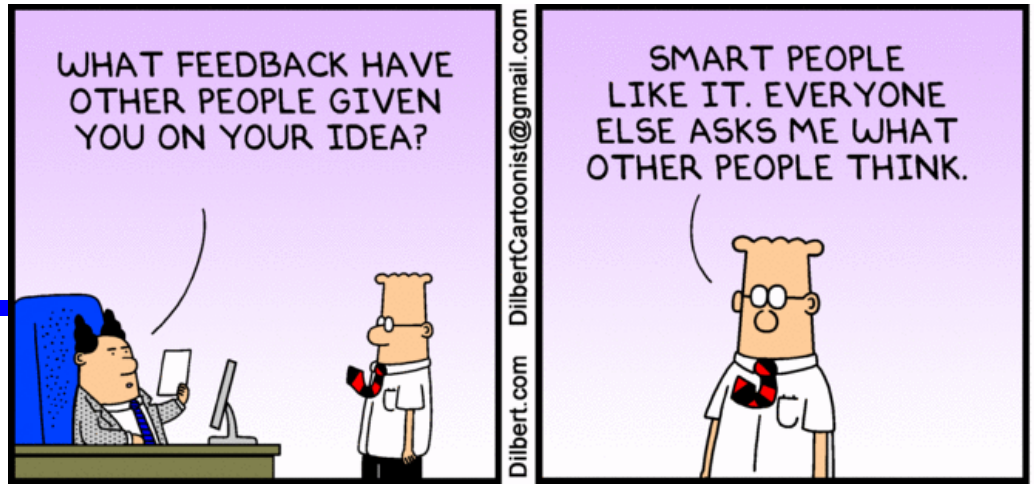
- Aims
  - Dependent on each other *(ie Aim 1. Develop the test; Aim 2. Test the test)*
  - Unrealistic
  - Unrelated = '*unfocused and over ambitious*'
  - Fishing (compare, correlate, describe, catalog, investigate, etc)
- Failure to meet reviewer expectations for format and content
  - What are you going to do? Why is it worth doing? Where will it lead? and (briefly) how are you going to do it?
  - Hard to find information

Remember the GOAL

Reviewer
- I understand
- This is interesting
- This is important
- I will advocate

Specific Aims

Tips



- Research how to
- Outline first
- Self-edit – For each sentence, ask:
  - *Is what I wrote true?*
  - *What is the point of what I just wrote?* – The reviewer should not have to guess

Specific Aims
Tips

- *What is the point of what I just wrote?* – The reviewer should not have to guess

Our *long-term goal* is to elucidate how OT modulates the neural systems underlying social information processing and social reward to enhance social motivation. We will measure OT in the basolateral amygdala (BLA) and the nucleus accumbens (NAcc).

Specific Aims
Tips

- *What is the point of what I just wrote?* – The reviewer should not have to guess

Our *long-term goal* is to elucidate how OT modulates the neural systems underlying social information processing and social reward to enhance social motivation. We will measure OT in the basolateral amygdala (BLA) and the nucleus accumbens (NAcc).

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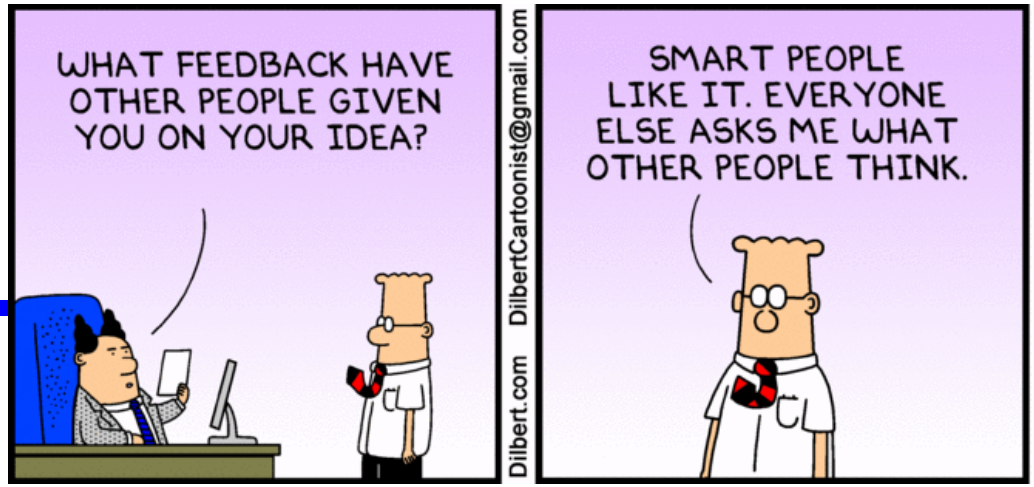
Specific Aims

Tips



- Research how to
- Outline first
- Self-edit – For each sentence, ask:
  - *Is what I wrote true?*
  - *What is the point of what I just wrote?* – The reviewer should not have to guess
- Who are you writing for? Who are the reviewers? In general, write for a scientist not in your field
- Help your reviewer help you
- Seek criticism
  - Least helpful comment ever: 'Looks good'

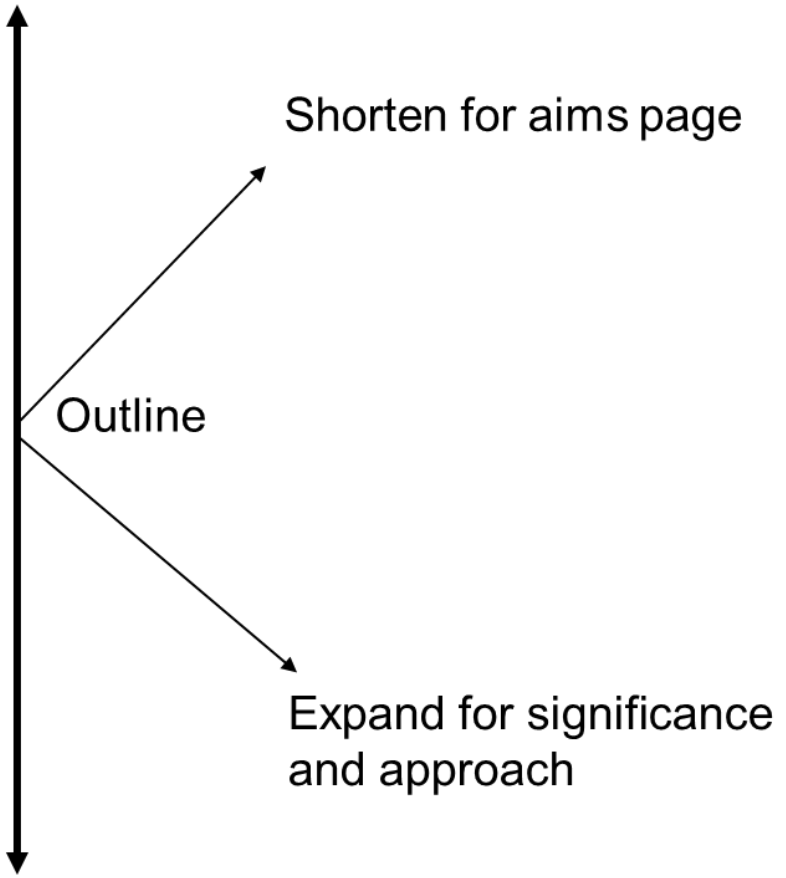
Specific Aims - Outline

The Research

- Overall "big picture"
  - Orient reviewer
  - NIH = Related to human health
- Known data
- Gap

- Long-term goal
- Rationale
- Overall Hypothesis

- Aims
  - Why
  - Specific hypothesis
  - How
  - What
  - Impact



Specific Aims
Summary

- The Specific Aims page may be the only page some reviewers read – take time with it
- Aesthetics and layout matter
- Sets the tone for the whole rest of the proposal

Specific Aims
Reference

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- Yang OO (2005) Guide to Effective Grant Writing: How to Write an Effective NIH Grant Application, Springer Science+Business Media, NY, NY.
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- Davidson (2005) Grant writing and academic survival: What the fellow needs to know. *Gastrointestinal Endoscopy* 61(6):726-727.
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- http://www.virginia.edu/vpr/postdoc/docs/WamhoffGrantWrting101.pdf
- https://www.soph.uab.edu/ssg/files/Club_ssg/Selling%20Your%20Specific%20Aims.pdf

Specific Aims
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- https://www.biosciencewriters.com/NIH-Grant-Applications-The-Anatomy-of-a-Specific-Aims-Page.aspx
- https://www.rheumatology.org/Portals/0/Files/Specific%20Aims%20-%20Do's%20and%20Don'ts.pdf
- http://research.uga.edu/docs/units/ope/Anatomy-NIH%20Specific-Aims-Page.pdf
- https://depts.washington.edu/anesth/research/grantsmanship/session3_WritingEffectiveSpecificAims.pdf

Specific Aims

Examples

- http://www.niaid.nih.gov/researchfunding/grant/Documents/Wahlbyresplan.pdf
- http://pda.grad.uci.edu/files/2013/01/3-01-13-NIH-Specific-Aims-examples.pdf
- https://www.uab.edu/medicine/cfar/images/Specific_Aims_Examples.pdf
- https://www.mailman.columbia.edu/sites/default/files/legacy/SpecificAims10.21.14PRFPOSTED_PDF.pdf

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