Hypothesis and Specific Aims

1. Hypothesis

   a. Make it easy to find! Set it off, italicize it.
   b. Make it specific

   *Not:* ...and the social fabric of the community (Junes et al., 1999). We, therefore, hypothesize that climate will affect behavior. This will be examined by...

   *Instead:* ...and the social fabric of the community (Junes et al., 1999). We, therefore, have developed the following hypothesis:

   **Hypothesis:** Groups living in more temperate climates will show (1) increased social interactions (e.g., more frequent group discussions) and (2) more complex social structures (e.g., a more elaborate leadership hierarchy).

   This hypothesis will be examined by...

2. Specific Aims

   a. Make them easy to find
   b. Make them specific

   *Not:* In this project we will first develop a method for measuring changes in motor behavior and then we will examine the effects of ambient temperature on motor function.

   *Instead:* In this project we will have two specific aims:

   **Specific Aim 1:** To develop a method for quantifying motor behavior in the adult rat.

   Adult, male rats will be placed in an animal cage placed on a platform designed to measure the amplitude and duration of movement in the x, y, and z planes. Data from the output of this platform will be compared with ratings of a videotape made by a blinded observer. Animals will be studied under basal conditions and during exposure to drugs that are either stimulating (e.g., amphetamine) or sedating (e.g., pentobarbital). Adjustments made to the platform devise as necessary to obtain reliable readouts.

   **Specific Aim 2:** To examine the impact of ambient temperature on motor behavior.

   Using the equipment developed and validated in Aim 1, we will examine motor behavior in adult male rats as a function of a change in ambient temperature from the normal housing temperature (20 °C) to one that is lower or higher (range: 5°C - 40°C) for up to 5 hours.
EVALUATING
FELLOWSHIP APPLICATIONS

A. CANDIDATE
1. Credentials
   - Academic
   - Productivity
2. Commitment
   - To training
   - To relevant career
3. Letters of Reference
   - Sponsor
   - Chair
   - Others

B. TRAINING PLAN
1. Thoroughness in preparation
   - Input from candidate
   - Input from mentor
2. Matched to needs
3. Comprehensiveness
   - Background in field
   - Methodology
   - Professional skills
   - Research ethics
4. Likelihood of success

C. RESEARCH PLAN
1. Relevance to career development
2. Scientific merit
   - Clever and important
   - Uses recent literature
   - High quality
   - "Cutting edge"

D. MENTOR
1. Nature of role
   - Preparing document
   - Training program
2. Relevance to candidate
   - Interests
   - Needs
3. Training experience
4. Recent productivity
   - Number, focus of publications
   - Quality of journals
5. Grant support

E. ENVIRONMENT
1. Other faculty
   - Relevance
   - Standing
   - Interactions
2. Educational programs
   - Seminars
   - Journal clubs
   - Courses
3. Facilities
   - Equipment
   - Core services

INSTITUTIONAL COMMITMENT
1. Commitment to
   - Research in general
   - Specific research area
APPENDIX

Common Sections of a Grant Application

1. Title

A. Conform to the agency’s guidelines for titles (there may be a limit on length)

B. Make the title an accurate statement of long-term goals

C. Include keywords in the title

2. Abstract

A. Make your abstract
   - simple (the general public and/or policy makers may read it)
   - accurate
   - not provocative to groups that may not understand your research
   - interesting

B. Include keywords in the abstract

3. Budget & budget justification

A. Use the budget forms and categories developed by the funding agency

B. Make your request reasonable
   - for the project
   - for agency (i.e., don’t ask for more than the maximum award)
   - for your level of experience

C. Carefully justify when requested to do so (see table below)
   - NIH “modular” budgets require less justification than traditional budgets.
   - If justification is required, carefully define all funds & time spent on project

D. Explain any appearance of overlap with your other sources of funding

E. Cost-share when possible
   - funds
   - services
   - equipment

F. Personnel: If your institution provides personnel (i.e., faculty, students, staff) with “fringe benefits” (e.g., healthcare, retirement plan, etc.), you may need to include this in your budget. This is often assessed as a set percentage of the individual’s salary, and the rate may vary with the rank of the individual.
G. "Direct costs" (DC): this is the money that you need to do the research that you propose. It includes funds for personnel, supplies, equipment, travel, etc.

H. Indirect costs (IDC) or Facilities and Administration (F&A) costs: This is often assessed by the institution on research proposals to cover the costs of providing space, heat, light, janitorial services, etc. to the researcher. The rate is negotiated by the institution with the funding agency, and is assessed based on the total direct costs on the grant, though some items such as equipment, are often not included in this calculation. Note that some agencies limit the IDC rate for certain types of awards. You often need to get special permission from your institution if you are applying for a grant which provides IDC below your institution’s normal rate.

**Budget Justifications**

<table>
<thead>
<tr>
<th>Item</th>
<th>Common issues</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personnel</strong></td>
<td>Name of individual (when known)</td>
<td>Ben Aster, Ph.D., 20% effort. Dr. Aster is responsible for program evaluation. He develops evaluation instruments, administers surveys, compiles and analyzes the data, initiates follow-up inquiries, and writes evaluation reports</td>
</tr>
<tr>
<td></td>
<td>Percent effort on project</td>
<td>Travel to conference ($975 requested):</td>
</tr>
<tr>
<td></td>
<td>Role on project</td>
<td>Airfare (roundtrip, coach) = $400</td>
</tr>
<tr>
<td></td>
<td>Responsibilities</td>
<td>Ground transport (airport/hotel): $20 x 2 = $40</td>
</tr>
<tr>
<td><strong>Travel</strong></td>
<td>Purpose of trip</td>
<td>Lodging: 3 nights x $125/night = $375</td>
</tr>
<tr>
<td></td>
<td>Cost of airfare (roundtrip, coach)</td>
<td>Per diem: 4 days x $40/day per diem = $160</td>
</tr>
<tr>
<td></td>
<td>Ground transport</td>
<td><strong>Animals ($1400 requested):</strong></td>
</tr>
<tr>
<td></td>
<td>Cost and # nights in hotel</td>
<td>Cost to purchase: 40 rats x $30/rat = $1200</td>
</tr>
<tr>
<td></td>
<td>Amount &amp; # days of per diem</td>
<td>Animal care: 40 rats x 10 days x $0.50/day = $200</td>
</tr>
<tr>
<td><strong>Animal</strong></td>
<td>Number of animals to be used</td>
<td></td>
</tr>
<tr>
<td>subjects</td>
<td>Cost per animal to purchase</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of days housed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cost per day of housing</td>
<td></td>
</tr>
</tbody>
</table>

**Sample budget calculations**

- **Salaries**: $50,000
- **Fringe benefits**: $10,000  
  (example = 20% rate)
- **Supplies**: $25,000
- **Equipment**: $15,000
- **Direct Costs (DC)**: $100,000
- **Indirect Costs (IDC)**: $42,500  
  (example = 50% rate, excluding equipment)
- **TOTAL AWARD**: $142,500
4. Biographical sketches

A. Include for critical personnel
   1) Principal investigator (PI)
   2) Co-Principal Investigator (Co-PI)
   3) Co-Investigators
   4) Collaborators
   5) Consultants
   6) Research assistants with special skills

B. Highlight relevant accomplishments

C. Ensure accuracy
   1) training, experience
   2) grant support
   3) publications
      a) separate peer reviewed articles, reviews/chapters, and abstracts
      b) place in chronological order with complete info re title, vol., and page numbers
      c) limit “manuscripts in preparation” to manuscripts you would be willing to send to the committee

5. Research plan

A. Typical components of a research plan (NIH terminology)
   - Specific Aims (short overview of what you aim to accomplish) (~ 5%)
   - Background & Significance (why work is important, necessary) (~10-15%)
   - Preliminary Data (pilot data) (25%)
   - Research Design & Methods (the experiments you will conduct) (55-60%)

B. General guidelines
   1) state objectives clearly
   2) provide background on the state of the field. Include information about
      a) general literature (do a thorough but brief review of the literature)
      b) your previous work related to the topic
      c) the work of likely reviewers
   3) be hypotheses-driven
   4) highlight your strengths in the area of research
      a) your experience and that of collaborators (including publications)
      b) methodology and equipment available
      c) unique approach
      d) strong, testable hypothesis
5) emphasize the practicality of your proposal
   a) methods in hand (in your publications?) or easily learned (how?)
   b) preliminary data available
   c) time and skills of staff adequate to conduct studies proposed
   d) time, resources required as compared to that requested

6) discuss expected outcomes and contingencies: a series of experiments must not rely on finding a specific result in prior experiments

Example of an organization for a given experiment:

Expt. 1: This title should match one of the specific aims

   Hypothesis: Stating your hypothesis up front, in italics, and indented will increase the chance of funding.

   1: Rationale: This is why I want to do this experiment.

   2: Protocol: This is what I will do, exactly. I include such details as the number of animals and methods of data analysis.

   3: Comments: This is what I expect to find. Also, here are some alternative outcomes and/or problems I might encounter along with my plans to deal with these contingencies. Finally, if I end up with a little extra time, this is what I will do with it.

6. Subject welfare

   A. Adhere to all relevant guidelines (local institution, funding agency, national and international governments)

   B. Be clear about appropriateness of
      1) species
      2) numbers of subjects
      3) treatments
      4) special conditions

7. Letters of recommendation or agreement (if appropriate)

   A. Letters of recommendations
      1) may be required (for certain fellowships, etc.)
      2) could be optional (may help establish credibility)
B. Letters of agreement from collaborators and consultants
   1) the individual should detail what work they have agreed to do for project
   2) help the author make the letter as specific and positive as possible
   3) provide a copy of the proposal
   4) indicate what you hope the author will include in the letter
   5) suggest that they indicate enthusiasm for the proposal and for you

8. Supplementary materials

A. Examples
   1) color or enlarged figures
   2) reprints of your published articles
   3) updated information (new results, accomplishments)
   4) find out the funding agency will accept supplementary materials (some do not)

B. Never use supplementary materials to circumvent page limits on the application

* 

Example

The following two pages are designed to represent two versions of some text from a research grant proposal: a poor version and a much improved version. We suggest that you begin with the first version, examining its overall appearance and the content of the first paragraph. Think of ways that that this version might be improved. Then consider the changes we have made in the second version. (Note: In addition to changing the overall appearance, we also have changed the text of the first paragraph.) There is also a set of references that follow that is related to the subject matter.