



# **Writing Research Articles: Practice Materials and Handouts**

**Constance D. Baldwin, Ph.D.  
Professor of Pediatrics  
University of Rochester Medical Center**

**An open access, self-directed, online learning module:**

**[http://www.academicpeds.org/espauthoring/page\\_01.htm](http://www.academicpeds.org/espauthoring/page_01.htm)**

**by**

**Constance D. Baldwin, Ph.D.**

**Professor of Pediatrics**

**University of Rochester Medical Center**

**Rochester, New York**

**[Constance\\_Baldwin@urmc.rochester.edu](mailto:Constance_Baldwin@urmc.rochester.edu)**

# **The Nuts and Bolts of Scientific Writing**

- 1. Controlling Word Choice and Sentence Structure**
- 2. Writing Paragraphs and Extended Arguments**



## SAMPLE ABSTRACT

### IDENTIFYING GAPS BETWEEN FACULTY AND RESIDENT EXPECTATIONS OF RESIDENT AUTONOMY

*Eric A. Biondi, MD, Peter Harris, MD, Constance D. Baldwin, PhD, Mark Craig, MD, Lynn C. Garfunkel, MD, Laura P. Shone, DrPH, MSW, Melissa Cellini, MD, William S. Varade, MD, University of Rochester Medical Center, Rochester, NY*

**Background:** With the advent of work hours restrictions and generational changes in residents, the culture of residency is shifting. Residents are regaled with faculty anecdotes, "When I was a resident...", and faculty members are frustrated by residents who seem to have different educational expectations and priorities. This subjective evidence suggests a cultural divide, but there are few evidence-based reports to substantiate or clarify areas of divergence.

**Goal:** To objectively identify specific differences in how pediatric residents and faculty perceive resident autonomy and expectations.

**Design:** Parallel surveys were distributed to all pediatric and medicine-pediatric residents and to pediatric faculty who regularly interact with residents at the University of Rochester Medical Center. The surveys contained questions about resident performance, work ethic, autonomy, and faculty-resident interactions. The 16-question resident survey and the 20-question faculty survey included seventeen parallel items. Several questions allowed for multiple responses and comments.

**Results:** Of the 78 residents and 100 faculty members who received the survey, 77% of residents and 67% of faculty responded. Residents at all levels differed significantly from faculty in their perception of residents' ability to present a complete HPI and thorough patient assessment. They also differed significantly on residents' degree of autonomy, faculty encouragement of residents' independent thought, and amount of faculty feedback. Of the 17 parallel responses, residents differed significantly with the faculty on 10 at  $p < .001$  level and on 6 others at  $p < .05$  level. Their sole area of agreement was how often faculty provide too much direction.

**Conclusions:** We found a gap between faculty and residents in their perceptions of resident autonomy and of faculty support for resident autonomy. Given the importance of autonomy in independent practice after residency, further studies are needed to investigate the validity and possible sources of these differences in perceptions, so that strategies to enhance resident autonomy in training can be developed.

## ARTICLE PLANNING WORKSHEET

<p><b>Introduction:</b></p> <ul style="list-style-type: none"> <li>• What is this paper trying to prove?</li> <li>• Why does it matter?</li> <li>• What gap in the literature will the study fill?</li> <li>• What literature needs to be discussed?</li> </ul>	
<p><b>Methods:</b></p> <ul style="list-style-type: none"> <li>• What part of the methods needs most detailed description?</li> <li>• What potential weaknesses need to be addressed?</li> </ul>	
<p><b>Quantitative Results:</b></p> <ul style="list-style-type: none"> <li>• How much data should be included? Are the results as described in the abstract enough for a paper?</li> <li>• Consider which results should be presented in graphics, tables, or narrative.</li> </ul> <p><b>Qualitative Results:</b></p> <ul style="list-style-type: none"> <li>• What themes are most important, and what quotations best illustrate them?</li> <li>• How should the information be presented? Thematic summary with embedded quotations, or table of quotations? Or both?</li> <li>• Can an overarching framework be described?</li> </ul>	
<p><b>Discussion:</b></p> <ul style="list-style-type: none"> <li>• What is the strongest, most interesting finding to highlight?</li> <li>• What results need more careful discussion (e.g., in relation to previous reports?)</li> <li>• What are the limitations of the study?</li> <li>• Are the conclusions stated with sufficient qualifiers (e.g., findings in our sample demonstrate; findings suggest, may indicate, are consistent with the interpretation that...)</li> </ul>	

# Autonomy in Residency Training: Gaps Between Resident and Faculty Perceptions

*Eric A Biondi, William S Varade, Lynn C Garfunkel, Justin F Lynn, Mark S Craig, Melissa M Cellini,  
Laura P Shone, J Peter Harris, Constance D Baldwin, PhD*

## Abstract of Completed Article

**Purpose:** To identify and interpret differences between pediatric resident and faculty perceptions of resident autonomy and faculty support of resident autonomy.

**Methods:** Parallel questionnaires were sent to pediatric residents and faculty at the University of Rochester in 2011. Questions addressed self-determination theory constructs (autonomy, competence, relatedness), resident performance, and faculty-resident interactions. Distributions of responses to 17 parallel likert scale items were compared by Wilcoxon Rank-Sum tests. Written comments were analyzed qualitatively.

**Results: Respondents included 62 residents and 71** faculty members (response rate, 75%). Residents and faculty responses differed significantly on 15 of 17 parallel items, but both groups agreed that faculty direction was sometimes excessive. Written comments suggested that self-determination constructs (autonomy, competence, relatedness) were closely interrelated in residency training. Faculty reported reluctance to give passive residents autonomy in patient care, especially if patient acuity was high. Residents expressed frustration when their care plans were countermanded, particularly without explanation. Residents who displayed appropriate autonomy, combined with competence, were given more opportunities to practice skills. Some faculty work to overcome residents' passivity by clarifying and reinforcing expectations.

**Conclusions:** Faculty and residents had discordant perceptions of resident autonomy and faculty support for resident autonomy. Passive residents may be losing needed learning opportunities, if faculty who interpret their passivity as incompetence fail to give them enough independence. Strategies that support autonomy may help residents gain confidence and enhance their relatedness to team members and supervisors, and may help programs adapt to accreditation requirements mandating supervision of residents while fostering their increasing independence.

# Planning a Study and Presenting it in an Article

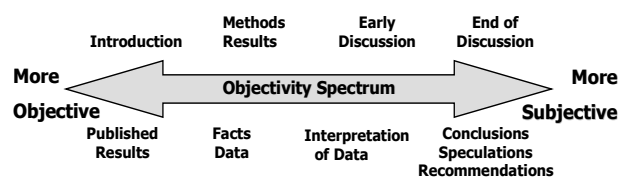
<b>Core Steps for Planning a Study</b>	<b>Where presented in paper</b>	<b>Strategies for successful presentation</b>
1. Choose a problem and develop a broad research question	Introduction	Focus on the literature that shows importance of problem
2. Review the literature	Introduction	Focus on studies that define the gap in knowledge which your study addresses
	Discussion	Use previous studies to confirm, question, or clarify your results
3. Refine and focus your research question	Introduction	Clearly state what you are trying to prove, why the question is important, and why your study will provide a novel answer
	Methods	Show that you have used the best design and methods to get a valid and reliable answer to the question
	Results	Organize section to systematically present your data relevant to the central question
	Discussion	Highlight and interpret your relevant results, draw sound conclusions, and show how they relate to the question with which you began
4. Select study design and methods	Methods	Design and methods should clearly address your question; quality of methods will determine quality of results
5. Collect and analyze data	Results	Present results in organized fashion, following your study design
6. Interpret data and draw conclusions	Discussion	This section should weigh the value of your data in answering your central question

# Guidelines for Writing a Quantitative Educational Research Article

## Initial Planning Questions

1. How shall I convert my project into a reportable study?
2. What were the problem and specific question addressed? Why are these important for the theory and practice of education?
4. What challenges do I face in putting my argument across? Where and how will I address these issues?
5. What journal should I target? (medical, education, other?)

## Sequencing Information Along Spectrum of Objectivity



## Abstract

### Strategies

- Write abstract to help readers decide whether to read or download
- Make it clear and informative (address importance, validity, applicability to other educational settings)
- Be sure the primary question and conclusions come through clearly

### Content and organization

1. Journals provide length limits and formats
2. Follow same order as sections of the paper (with subheadings if required)
3. Clear summary is more important than details of data (this is not a meeting abstract)
4. State your conclusion briefly and clearly, but with essential qualifications:  
**Don't let the brevity of an abstract lure you into overstatement**

## Introduction

### Strategies

- Define question to be addressed
- Establish the study's novelty and importance to medical education
- For most medical education journals, keep the introduction short and focused

### Content and organization

1. Adhere to journal style for length, content
2. Concisely state question and why it matters
3. Review essential literature:
  - Be selective! Summarize background to explain:
    - choice of question/hypothesis
    - claim to novelty and significance
  - Save detailed comparisons with previous studies for Discussion
4. In final paragraph, briefly describe:
  - Study question or hypothesis
  - Design
  - Subject and sample selection
  - General overview of Methods

## Methods

### Strategies

- Keep it simple and brief
- Say enough about design to allow reader to evaluate the study
- Define key variables, use names consistently
- Use headings for clarity and easy reference

### Content and organization

1. Overview of study design
  - Define type (e.g., retrospective or case-control study; prospective, randomized, controlled trial) and its rationale
2. Description of setting and sample
  - Population, participants (number, characteristics relevant to problem) and setting for recruitment [1 sentence on IRB approval]
  - Inclusion/exclusion criteria
  - Comparison groups, other precautions to minimize bias
3. Study protocol or intervention
  - Time course
  - Learner assessment, if used (e.g., pre-post-follow-up, self-assessment)
4. Outcome measures (for learners and/or program)
  - Methods to measure outcomes [Give more detail where methods are novel, less where previously published]
  - For new tools, description of how they were validated, pilot tested
  - Unpublished tools may be included in Appendix
5. Analyses
  - Statistical methods used (define terms and describe unfamiliar tests)

- Explain rationale for novel methods

## Results

<i>Strategies</i>	<i>Content and organization</i>
<ul style="list-style-type: none"> <li>➤ Present results systematically; generally use same order throughout paper</li> <li>➤ Keep like things alike:               <ul style="list-style-type: none"> <li>• Label variables consistently</li> <li>• Use similar formats for tables/figures and statistical notations</li> </ul> </li> <li>➤ Use headings for clarity and easy reference</li> <li>➤ Answer all research questions; include negative findings or discrepant data</li> <li>➤ Let the data speak for themselves:               <ul style="list-style-type: none"> <li>• Presentation should indicate trend in your reasoning, <u>BUT</u></li> <li>• Generally avoid interpretation of results</li> <li>• Strictly avoid broad conclusions and speculations</li> </ul> </li> </ul>	<ol style="list-style-type: none"> <li>1. Typical order of presentation:           <ul style="list-style-type: none"> <li>• Describe sample collected first</li> <li>• Then follow order of research questions, hypotheses, chronology, or design elements</li> <li>• In general:               <ul style="list-style-type: none"> <li>○ present simple results before complex</li> <li>○ give prominence to strongest findings</li> <li>○ Provide subsection headings if needed for clarity</li> </ul> </li> </ul> </li> <li>2. Presentation of numerical data           <ul style="list-style-type: none"> <li>• Limit graphs, tables to key data; design them to highlight important results</li> <li>• Choose effective presentation formats:               <ul style="list-style-type: none"> <li>○ Use graphics to show relations between data sets</li> <li>○ Use tables if specific numbers are essential</li> <li>○ Otherwise, use narrative</li> </ul> </li> <li>• Briefly interpret figures, tables, images in narrative (but <u>don't</u> reiterate data)</li> </ul> </li> <li>3. Narrative presentation of results           <ul style="list-style-type: none"> <li>• Stick to the facts</li> <li>• Keep story as simple and focused as possible without distorting meaning               <ul style="list-style-type: none"> <li>○ Avoid over-explanation</li> <li>○ Avoid detailed data if summary is adequate</li> </ul> </li> <li>• Omission of tangential data will almost always strengthen your paper</li> </ul> </li> </ol>

## Discussion

<i>Strategies</i>	<i>Content and organization</i>
<ul style="list-style-type: none"> <li>➤ Highlight key findings and forestall criticisms</li> <li>➤ Relate conclusions to original hypotheses or research questions</li> <li>➤ Seek balance in interpreting results:               <ul style="list-style-type: none"> <li>• Over-statement can be fatal, but</li> <li>• Under-statement may hide the importance of study</li> </ul> </li> <li>➤ Be selective! Discuss only results that deserve comment</li> <li>➤ <u>Don't</u> disparage or attack previous studies; <u>do</u> try to explain differences</li> <li>➤ In discussing limitations, evaluate their potential impact on usefulness of results.</li> <li>➤ Separate conclusions/speculations from interpretations of results</li> </ul>	<ol style="list-style-type: none"> <li>1. General plan for Discussion:           <ul style="list-style-type: none"> <li>• First, highlight key findings in the context of the central purpose of study. Do findings support or dictate change in current educational practice?</li> <li>• Next, evaluate findings in relation to literature</li> <li>• Then discuss strengths and limitations of study</li> <li>• End with conclusions and recommendations</li> </ul> </li> <li>2. Strategic issues in ordering Discussion:           <ul style="list-style-type: none"> <li>• Begin and end with most exciting, convincing, novel results. Put in the middle what is debatable, complicated, or boring</li> <li>• Organize mid-section systematically (e.g. follow order of Results)</li> <li>• Avoid speculations, recommendations, and suggestions for future studies until the final paragraph(s)</li> </ul> </li> <li>3. In discussion of other studies, always begin with your results, then relate to others' findings.           <ul style="list-style-type: none"> <li>• Compare your findings with previous results</li> <li>• Clarify complex issues raised by your results</li> <li>• <b>Don't repeat literature review from Introduction!</b> <ul style="list-style-type: none"> <li>○ <u>There</u> you establish study's importance and novelty</li> <li>○ <u>Here</u> you use previous reports to help interpret your findings</li> </ul> </li> </ul> </li> <li>4. Discuss limitations as well as strengths           <ul style="list-style-type: none"> <li>• <u>Design weaknesses</u>: cluster in a paragraph before conclusions</li> <li>• <u>Methodological problems</u>: discuss in the context of specific findings</li> <li>• <u>Serious problems</u>: indicate how much they undermine confidence in validity of results (i.e. minimize the damage)</li> </ul> </li> <li>5. End with a summary of key findings and brief interpretation of their significance           <ul style="list-style-type: none"> <li>• Clearly label speculations and recommendations that go beyond data</li> <li>• Propose specific future studies if suggested by novel results (<u>not</u> simple confirmatory studies)</li> </ul> </li> </ol>



# Revising Scholarly Articles after Submission to a Journal

Receiving negative reviews of a submitted paper is a painful experience for most authors. Rarely do any of us get a paper accepted without significant revisions, and virtually everyone has had to deal with rejection of an article we thought was worthy of publication. This is part of the life of every academic. You can learn to cope with the negative emotions, so your response to rejection is not paralyzing. It does become easier with time!

## What to expect:

- 1) Letter from the editor stating the journal's decision to a) accept paper pending minor revisions, b) reconsider paper if resubmitted with major revisions, or c) reject the paper. **NOTE: Both a) and b) are good outcomes!!**
- 2) Editor's overall comments that may summarize the opinions of all the reviewers, and indicate which reviewers' comments are particularly important to address carefully in revision.
- 3) Comments from 2-3 reviewers. Some comments may be fairly general, others very specific. Sometimes reviewers will end with a recommendation about acceptance with revisions or rejection. A key criterion for reviewers is whether this work represents a significant contribution to the field, so it is important at every stage of the submission/ resubmission process to emphasize that point. **NOTE: Value the specific comments. The reviewer made a great effort to help you improve the paper.**
- 4) Instructions on how to proceed with a resubmission, if allowed.

**PRIMARY RULE: Don't hide the critique in a drawer!** The journal will usually give you a deadline for resubmission (generally around 2 months). If you are going to submit elsewhere, **set your own deadline for resubmission and adhere to it!**

## How to get started:

- 1) Team should have a plan at time of initial submission for who will tackle the first revision.
- 2) Read through all the critiques to get a general idea of the response.
- 3) Re-read manuscript.
- 4) Study all the critiques in detail, noting manuscript sections needing change.
- 5) Decide whether further data collection or analysis is required. What is a feasible deadline for revision and resubmission? [You **may** be able to negotiate extra time if new analyses are required.]

## If you are asked to revise and resubmit:

- 1) Prepare a well-organized response to the journal. Journal may have format for response: a table tracking revisions is often helpful, possibly accompanied by some narrative comments on strategic issues.
- 2) Always respond to all editor comments; normally respond to all reviewers' comments as well. **Note: Sometimes not all requested changes are feasible—don't be afraid to say so, and why—but politely! Express gratitude for the reviewer's effort to help you improve your work.**
- 3) Write a cover letter that details all changes you have made. Include 1-2 sentences on why you think the article is novel and important to the field.

## If your paper is rejected, don't despair!

- 1) Immediately choose another target journal for resubmission. (Many teams have a second, and even third choice journal in mind when they submit to their first choice target.)
- 2) Rejection may not mean that the article is weak. It may have been ill-matched to the journal's readership or mission, or it may have addressed a topic covered in a recent issue of the journal.
- 3) Use reviewers' comments to improve the paper. Most will be relevant and useful. Even if they misunderstood or missed a point, you can try to say it more clearly.
- 4) When you revise for submission to a different journal, be careful to consider its special readership and mission. Sometimes a paper must be recast for a different dissemination venue.

# STEPS FOR EFFICIENT WRITING OF A JOURNAL ARTICLE

## ***Phase 1: Preparation***

1. Plan the paper when you plan the study (e.g., introduction and methods)
2. Plan ahead for writing co-authored papers:
  - Agree on first author and order of secondary authors
  - Reach consensus in advance on task-sharing and production schedule
  - Good collective tasks: interpret data, select journal, develop the “argument” of paper
  - A primary writer is essential to collate text contributions, define focus, manage revisions, make final decisions
3. Collect, organize, and prioritize bibliographic materials before you begin to write
4. Get data in order and sketch out tables and figures

## ***Phase 2: Writing and Revising the First Draft***

1. Choose journal, and study *Instructions to Authors* and several recent articles to define:
  - total page limit, and length and content of sections (including refs)
  - typical number and size of tables or figures
  - audience
    - \* Who are your readers?
    - \* How diverse is this audience?
    - \* How much do they know about the topic?
    - \* What is their level of interest in this topic?

Answers to these questions will determine your style, content, and methods of persuasion.

### **2. Define your primary purpose, i.e., What scientific question are you addressing and how will you answer it?**

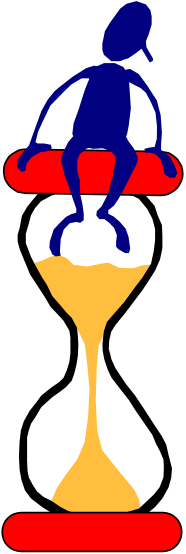
- Write down a brief statement of your focal question/purpose.
  - Keep it handy as you write, to help you (and your reader) stay focused on the main point of the paper.
3. Generate ideas (You need to make the bricks before you begin to build the wall.)
    - capture ideas on tape, in conversation, at keyboard
    - brainstorm with group (e.g., write ideas on post-it notes and sort topics into groups)
    - map ideas with sketches, charts, diagrams
    - give a seminar and receive feedback
  4. Sequence these ideas and shape first draft as quickly as possible (don't obsess over holes yet)
  5. Refine the tables and figures
  6. Now go back and systematically refine the document (**large scale** ⇒ **small scale**)
    - Logic and clarity of primary argument
    - Clarity of study design
    - Appropriate (conventional) placement of material in subsections of paper
    - Focus in selection of data to support primary argument (data, refs)
    - Organization of supporting data
    - Logic, clarity, focus, and continuity at paragraph level
    - Brevity and clarity at sentence level
    - Readability and formatting
    - Spelling

## **Rethink, reprioritize, reorganize, and then rephrase.**

### ***Phase 3: Feedback and Final Revisions***

1. Recruit reviewers: mentors, specialists, or collaborators, plus one “naive” reader. Never submit a paper that hasn’t been read by someone else.
2. Let document lie fallow. Do not read for at least 1 week, preferably 1 month, while the reviewers comments are coming in.
3. Assimilate and evaluate critiques.
4. Revise radically, if needed, but keep sequence of backups.
5. Before you submit the paper, re-review compulsively for:
  - numerical consistency at every level
  - clarity of formatting, especially in figures and tables
  - completeness and accuracy of references
  - conformity to every detail of journal style (especially references)
6. now when to stop. You’ll get another chance to revise when the reviews come back.

# WRITING PRODUCTIVITY: 10 TIPS FOR EFFICIENT WRITING



## 1. The first draft only has to get written to succeed

- Recycle old work to “prime the pumps”
- Write around an outline to avoid blank screen anxiety
- Write what is easiest first (e.g., description before analysis and evaluation)
- Or don’t write: draw pictures, dictate, talk to someone to capture main building blocks
- Imitate a good model
- Don’t obsess over holes or details (yet)

## 2. At the start, remain open to new ideas

- Give yourself room for new insights and directions as you compose
- Later, build a consistent, logically ordered progression of ideas

## 3. Develop regular writing habits

- Write during your personal “prime time” and protect this time from interruptions
- Write regularly (e.g., 1-2 hour periods, 2-4 times/week)
- Avoid binge writing
- Use rituals if they work for you!

## 4. Control your writing environment

- Create an environment that enhances your comfort, concentration, and efficiency
- If necessary, mobilize your writing environment!
- Take writing trips or attend writing retreats

## 5. Multi-task and recycle

- Turn a presentation abstract into a talk, and then into a paper
- Turn a seminar into a grant proposal
- Reuse grant material in papers: Background/Signif ⇒ Introduction; Research Design and Methods ⇒ Materials and Methods

## 6. End a writing session at a new starting point

- Don’t end a session at the end of your ideas
- Before you stop, jot down a quick outline of ideas for your next session

## 7. If you stall out, step back to get a fresh perspective

- Make a quick outline. Are critical elements missing or duplicated?
- Put the text aside and tell a colleague what you are trying to say
- Dictate your thoughts and listen for key ideas and new insights

## 8. Revise efficiently, from large to small scale

- Logic and clarity of main argument
- Clear presentation of study design
- Focus, organization of supportive data
- Placement of material in expected places
- Paragraphs: clarity, focus, continuity
- Sentences: clarity and brevity
- Formatting and readability
- Grammar and spelling

## 9. Exploit the power of the computer

- Compose at the keyboard
- Begin with an outline and fill in the text around it
- Recycle old prose (even emails)
- Free yourself to experiment (e.g., save dated backups, use virtual wastebasket )

- Keep all manuscripts materials on one memory stick
- Develop a literature review table (concepts, refs, applications to study)
- Use electronic tools (esp. a reference manager—but don't let spell check substitute for careful proofing)

#### 10. Expect to revise, and revise again

- Efficiency won't eliminate the need to rewrite and revise
- Anticipate at least 5-6 drafts for papers, 4 for grants

***Few (if any) writers  
avoid the labor of revisions!***

## SEVEN TIPS FOR FIGHTING PROCRASTINATION

### 1. Fight to protect your writing time

- Identify writing as a professional priority
- Set aside regular, prime time for writing
- Protect this time vigorously

### 2. Set time-limited goals and reinforce them

- Set specific writing goals with deadlines
- Publicly announce your goals (to spouse, writing partner, colleagues, or boss)
- Ask for follow-up and reinforcement

### 3. Divide and conquer

- Subdivide a writing task into manageable units
- Set feasible goals (e.g. cut 10% of the words from a paper)
- Create a timeline and track progress (at least weekly)
- Reward incremental progress
- Celebrate completion

### 4. Create a writing support system

- Develop a support system to enhance productivity:
  - \* research team
  - \* peer-exchange (co-authors or writing partners; weekly productivity sessions)
  - \* writers' group
  - \* personal rewards system

### 5. Maximize the pleasure

- Emphasize what makes writing worthwhile to you—e.g.:
  - \* Capitalize on creative impulses
  - \* Use writing to strengthen the conceptual basis of your research
  - \* Socialize the process (find a partner)
  - \* Remind yourself of your ultimate goal
- Disguise the task as something more fun: give a talk, ask interested colleagues to review draft of paper

### 6. Minimize the punishment

- Proactively manage personal and professional conflicts
- Avoid exhausting writing binges
- Hire an editor if you need one

### 7. Curb your perfectionist urges!

- Don't aim for "perfection" before the final drafts
- Even then, recognize when enough is enough
- Review process will allow for further refinement from a new perspective

