How to Write a Research Introduction

Making a Case for Originality and Value of Research

Preparing Future Leaders
January 26, 2010

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Introduction to Research Introductions

- In traditional theses/dissertations, the introduction is the first chapter
- In articles written as thesis/dissertation, they are the first section, after the abstract
- The principles of building research introductions apply to both kinds
- It is generally a good idea NOT to draft an introduction before you have a good grasp of your research
Research Introductions

- Classic Thesis/dissertation
- Research article
- Poster
- Grant Proposal
- Proposal Abstract
- Prospectus
Purposes of Research Introductions

- To convince the audience that the research is original
- To convince the audience that the research is valuable, an important contribution to the field

Your case for originality and value is always made in the context of the field
Typical Structure of Introductions

- Lit review setting up the broader context of research, general to specific
- Lit review setting up the specific research problem
- Statement of research problem
- Statement of value of solving the research problem
- Preview of research
Originality: Establishing a Valid Research Problem
Typical Structure of Introductions

- Lit review setting up the broader context of research, general to specific
- Lit review setting up the specific research problem
- Statement of research problem
- Statement of value of solving the research problem
- Preview of research
Originality

The case for originality of research is made chiefly by establishing a convincing research problem, a gap in the present state of research in the field that your research will fill, an unknown that should be known.
Setting up a Research Problem

Establish what is known and then identify what remains unknown

1. A review of the pertinent literature (what is known, the specific context for the research)

2. A “negative turn” + a statement of what is unknown
Negative Turns

Negative turns are certain words and phrases that often indicate gaps in what is known:

- However, but, nevertheless
- Despite the fact that…
- Little is known about…
- Further research needs to be done to…

You should be able to turn the statement of a research problem into a research question
Examples of Negative Turns

“Previous studies using Northern blot analysis and RE-PCR detected vfgf transcripts between 3 and 72 hours post infection; however, the production of vFGF during virus replication has not been determined.”
Examples of Negative Turns

“Despite its commercial and academic expansion, many important questions about the theoretical bases of Emotional Intelligence remain.”
Examples of Negative Turns

“Famously, the *E. coli* strain named B by Delbrück and Luria in 1942 was chosen by the phage group that developed around Delbrück, Luria, and Hershey in the 1940s as the host for their common studies of the virulent phages T1-T7. However, the earlier history of B is less well established.”
Making a Case for a Research Problem

Establish what is known and then identify what remains unknown

1. A review of the pertinent literature (what is known, the specific context for the research)
2. A “negative turn” + a statement of what is unknown
Analyzing a Research Problem

1. Read the introduction of your article
2. Circle all negative turns
3. Identify the specific research problem
4. Summarize what is known and the gap in what is known
5. Restate the research problem as a question
6. Evaluate: Is the problem clearly established? How could you improve it?
Originality

A case for originality is effective if:

☐ The audience is convinced that your review of pertinent literature adequately describes what is known in the field

☐ The audience is convinced that your statement of the gap in what is known, your research problem, is valid
Brainstorming a Research Problem

1. Take 5 minutes to do some brainstorming on a piece of paper about your research project: a) what is known, b) what is the unknown, and c) what your research question is

2. In the next 5 minutes pair up with someone and describe your research problems to each other
Value: Answering the “So What?” Question of Your Research
Typical Structure of Introductions

- Lit review setting up the broader context of research, general to specific
- Lit review setting up the specific research problem
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Value

- Introductions answer the “so what?” question, the contribution of the research to the field.
- The solution to a research problem is typically not valuable in itself because it is defined so narrowly.
- Value is based on the implications of the research to broader issue(s) in the field.
- The introduction sets up more detailed treatment of value in discussion/conclusion.
Making a Case for the Value of Your Research

- Establish the value context for your research by using a lit review to set up the broader issue(s) for which your research has implications.

- State the value of your research by showing how solving the research problem affects the broader issue in the value context.
Typical Structure of Introductions

- Lit review setting up the broader (value) context of research, general to specific
- Lit review setting up the specific research problem
- Statement of research problem
- Statement of value of solving the research problem
- Preview of research
Example: Heinisch and Kirby

Read introduction of “Fractalkine/CX3CL1 Enhances Gaba Synaptic Activity at Serotonin Neurons in the Rat Dorsal Raphe Nucleus” by Heinisch and Kirby
Example: Heinisch and Kirby

Their research project:

“In the present study, we examined the neuroanatomical relationship between CL3CL1 and the 5-HT system as well as the functional impact of CX3CL1 on 5-HT neurons using whole-cell patch-clamp recordings in an in vitro rat brain slice preparation.”
Structure of Value Context

The case for value is usually built from general to specific.
Example: Heinisch and Kirby

1. Psychological stress alters immune responses
2. Serotonin (5-HT) plays an important role in neuronal response to stress
3. Chemokines interact with 5-HT to create symptoms of psychological stress
4. A type of chemokine, CX3CL1, binds with CX3CR1 to create inflammatory reactions
5. CX3CL1 and CX3CR1 are expressed in certain regions of the brain
6. CX3CL1 appears to provide a neuroprotective action in the brain
Boundary Between Value Context and Research Problem Context

1. Psychological stress alters immune responses
2. Serotonin (5-HT) plays an important role in neuronal response to stress
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Little is known about chemokine regulation of 5-HT
Linking Value Statement to Context

1. Psychological stress alters immune responses
2. Serotonin (5-HT) plays an important role in neuronal response to stress
3. Chemokines interact with 5-HT to create symptoms of psychological stress
4. A type of chemokine, CX3CL1, binds with CX3CR1 to create inflammatory reactions
5. CX3CL1 and CX3CR1 are expressed in certain regions of the brain
6. CX3CL1 appears to provide a neuroprotective action in the brain

“An impact of the chemokines, including CX3CL1, on the 5-HT system would have implications for stress-induced immunological dysfunction as well as our understanding of anxiety and depressive disorders associated with immune disorders.”
Making a Case for the Value of Your Research

- Establish the value context for your research by using a lit review to set up the broader issue(s) for which your research has implications.

- State the value of your research by showing how solving the research problem affects the broader issue in the value context.
Analyzing a Case for Value

1. Reread introduction of your article
2. Mark the paragraphs that establish value context(s) for the research
3. Mark a value statement that links the research to the value context
4. Evaluate: Does the introduction make a convincing case for the value of the research? How would you rewrite it to make it more convincing?
Value

A case for value is convincing if:

- It makes a clear and convincing connection between the research and a broader issue in the field
- The broader issue is itself considered important in the field
Brainstorming a Case for Value

1. Take 5 minutes to brainstorm the value of your research project: a) a brief summary of the specific research, b) a broader issue in the field for which the research has implications, c) what those implications are.

2. For the next 5 minutes, pair up with someone else and present the value of your research to each other.
Conclusions/Discussions Often Reverse Structure of Introductions

1. Summary of the results of the examination of the neuroanatomical relationship between CL3CL1 and the 5-HT system
2. Comparison with other related research
3. Implications of impact of chemokines on 5-HT
4. Implications of changes in 5-HT on immune system
5. Connections between immune system and psychological stress
Preview of Research
Typical Structure of Introductions

- Lit review setting up the broader context of research, general to specific
- Lit review setting up the specific research problem
- Statement of research problem
- Statement of value of solving the research problem
- Preview of research
Preview of Research

- In traditional theses/dissertations, it is typically a chapter-by-chapter description of what follows the introduction, usually the last section of the introductory chapter.

- In articles, a brief overview of the research methods or structure of article, often in the last paragraph of the introduction.

- The preview of research must be directly related to research problem, fills in the gap.
Example

“Here we explore whether phylogenies can be reconstructed from LTR Viterbi alignments for the three groups and compare them with trees obtained from pol gene alignments.”
Example

“Section 2 recalls some basic facts about plasma membranes, and section 3 explains why ions do not normally pass through plasma membranes. Section 4 describes a simple model of the transduction of CPPs in which electroporation and phosphatidylserine play key roles. Section 5 shows that the model is consistent with an empirical upper limit on the cargo of 40–60 amino acids and with measurements made by Tünнемann et al [31] on the fraction of mouse myoblasts transduced by polyarginines carrying fluorophores of 400 Da. Section 6 tells how to test three predictions of the mode The paper ends with a short summary in section 7.”
Preview of Research

A good preview or research:

☐ Establishes expectations for the readers of what they will find in the document

☐ Provides a link between the research problem and how that problem will be solved
Analyzing the Preview of Research

1. In the article you brought, mark the preview of research

2. Answer questions about it: Where is it located? Does anything come after it?

3. Evaluate: Does it effectively create expectations for the readers? Does it outline means to the solution of the problem? How would you improve it?
Process for Building Introductions

1. Establish the research problem, the gap, what is known and the unknown
2. Identify literature to present what is known
3. Write a statement of the problem with negative turn
4. Determine the source of value of solving research problem, a broader issue in field
5. Identify literature to create the value context for and link to the research problem
6. Write a statement of value with implications of research to value context
7. Write preview of research
Typical Order for Introductions

1. Lit review setting up the value context of research, general to specific
2. Lit review setting up the research problem, what is known
3. Statement of research problem, usually with negative turn
4. Statement of value of solving problem, linking back to value context
5. Preview of research
Purposes of Research Introductions

- To convince the audience that the research is original
- To convince the audience that the research is valuable, an important contribution to the field
- To provide a useful segue to the rest of the research report
Research Introductions

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