

- From

https://twitter.com/alexgarcia_atx/status/1558097727497687040?t=IYHiqUIOB-IPUom7sS-qrw&s=03

- 1. Use Short Sentences
- 2. Cut Common Phrases
- 3. Replace Adjectives With Data
- 4. Eliminate Weasel Words
- 5. Use The "So-What" Test
- 6. Avoid Adverbs
- 7. Be Objective
- 8. Cut Acronyms and Jargon
- 9. Use Subject-Verb-Object Sentence structure

Academic Writing

Dirk Riehle, Univ. Erlangen

NYT C12

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Agenda

1. The research paper
2. Sections of a research paper
3. Final research theses
4. Academic writing

1. The Research Paper

Research Papers

A **research paper** is

- A scientific article published after passing peer review

Scientific **peer review** is

- The review (assessment) of some artifact by scientific peers

The research paper is the gold standard of scientific publication

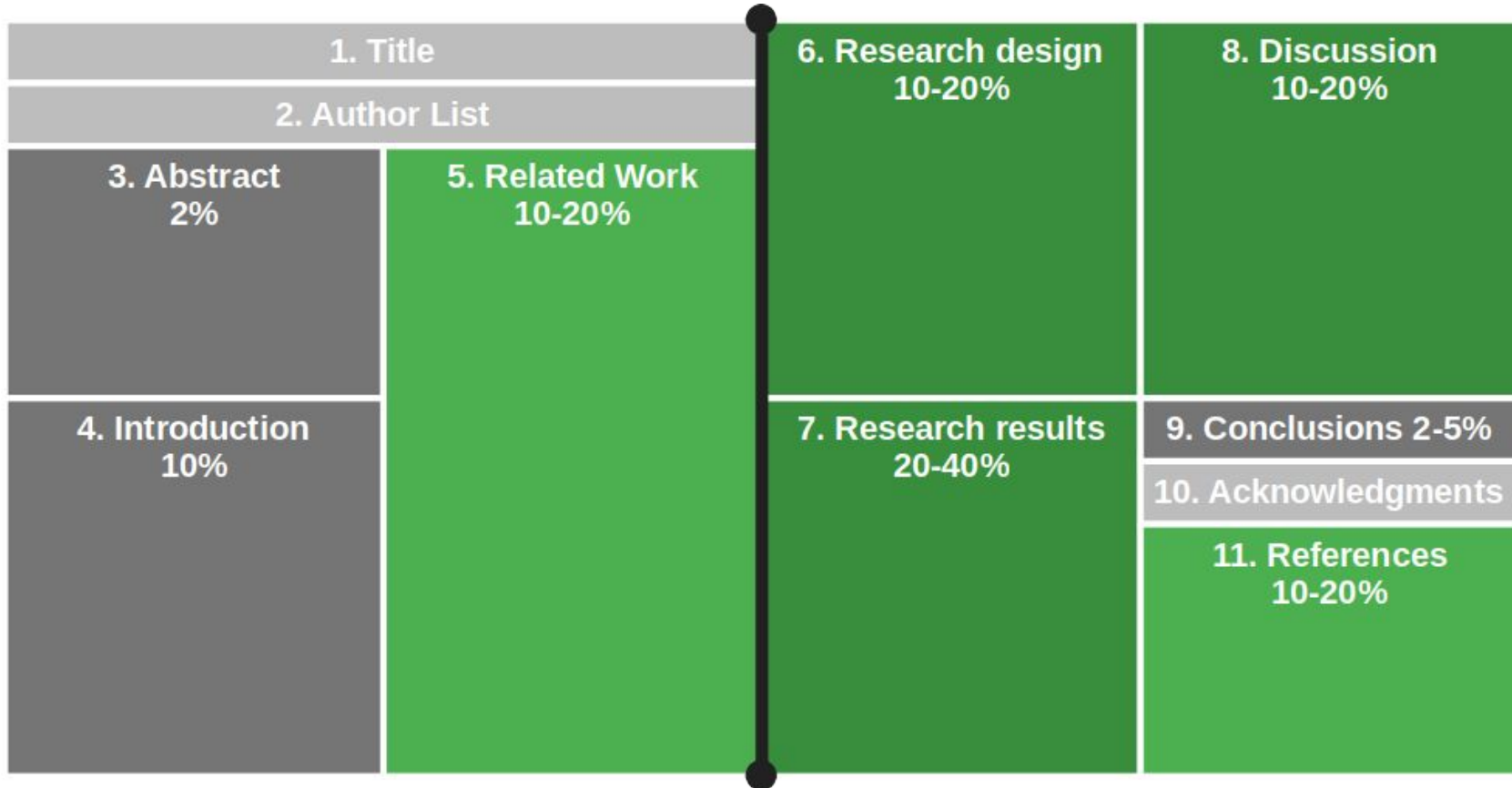
Other Types of Research Publications

Other types of research publications of varying quality

1. Public reviews
2. Monographies (books)
3. Presentation slides (lecturing)
4. Opinion pieces e.g. letters to the editor

The goal is public documented scientific exchange

Structure of a Typical Research Paper



2. Sections of a Research Paper

1. Title

The purpose of a paper's title is to

- Attract readers
- Indicate content

Good paper titles are

- Context dependent (where will this be published)
- Properly feed academic search engines

Best Practices for Paper Titles

Do

- Raise reader interest
- Be short and memorable
- Carry a message
- Indicate story

Don't

- Be long and academic
- Be incomprehensible
- Be overly cute

Examples of Paper Titles

Great title

- “A rational design process: How and why to fake it”

Good title

- “Nailing your thesis”

Poor title

- “A comparative evaluation of common theories in computer science”

2. Author List

The purpose of the author list is to

- Name and identify authors
- Rank-order their contributions

Construction and Interpretation of Authors Lists

An author to a research paper must have made

- A non-trivial intellectual contribution to the scientific content of the presented work;
- Authors of other contributions go into the acknowledgement section

There is a logic to the author ordering

- Minimum contribution gets you on
- Ranking of contribution moves you up
- Alphabetical ordering after that

Common patterns

- Ph.D. student followed by supervising professor
- First author followed by alphabetical list of other contributors

Rank Ordering Intellectual Contributions

Use a contribution model

- To first account for contributions
- Then to rank-order them

All contributions have to be non-trivial in advancing knowledge				
Not all possible contributions need to be touched upon; the goal is justifying the lead author position				
For a lead author, at least one main contribution needs to be solely or majorly				
I'm assuming that I'll only ever sign the corresponding document for the lead author, not all authors				
The evaluation activity of design science research can have its own analytical research substructure				

3. Abstract

The purpose of an abstract is to

- Draw readers in
- Summarize the article

Most readers are lost in the abstract

Patterns for Abstracts

One sentence each describing the

- Context / domain
- Research problem
- Approach taken
- Research results
- Consequences of work

(1) Open source software is available for free and many companies use it in their software. (2) However, managers worry that open source is only a temporary phenomenon and will go away, leaving them with abandoned software components that nobody is maintaining. (3) This article analyses the growth of open source software. (4) We show that open source is alive and keeps growing. (5) Thus, open source is a sustainable phenomenon and managers can use open source software in their products.

Kent Beck's four sentence abstract

1. The problem
2. Why the problem is a problem
3. One "startling sentence"
4. Implications of findings

(1) Users of open source software worry that the open source phenomenon is not sustainable. (2) They hesitate to adopt open source software and miss out on its economic benefits. (3) This paper shows that open source is a sustainable phenomenon. (4) Thus, users should not worry but adopt and gain the benefits of open source software.

4. Introduction

The purpose of the introduction section is to

- Keep drawing in the reader
- Set expectations straight
- Get going with the paper

Most readers' belief is lost in the introduction

Structure of the Introduction Section

The introduction section

- Extends the abstract
- Contrasts most relevant work
- Explicitly lists contributions of work
- Summarizes the structure of the paper

The Claim to Contributions

You should claim your contribution

- explicitly, and
- as precisely as you can

The contributions of this paper are:

1. An operational definition of how to measure open source project growth;
2. The assessment of past open source growth using a large sample representative of open source;
3. The now plausible prediction that open source software as a whole will keep growing in the future.

5. Related Work

A related work section surveys

1. Prior art you are building on
2. Relevant work (to yours)

Related work is identified through a literature survey

- An ad-hoc literature survey
- A structured literature review (see earlier lecture)

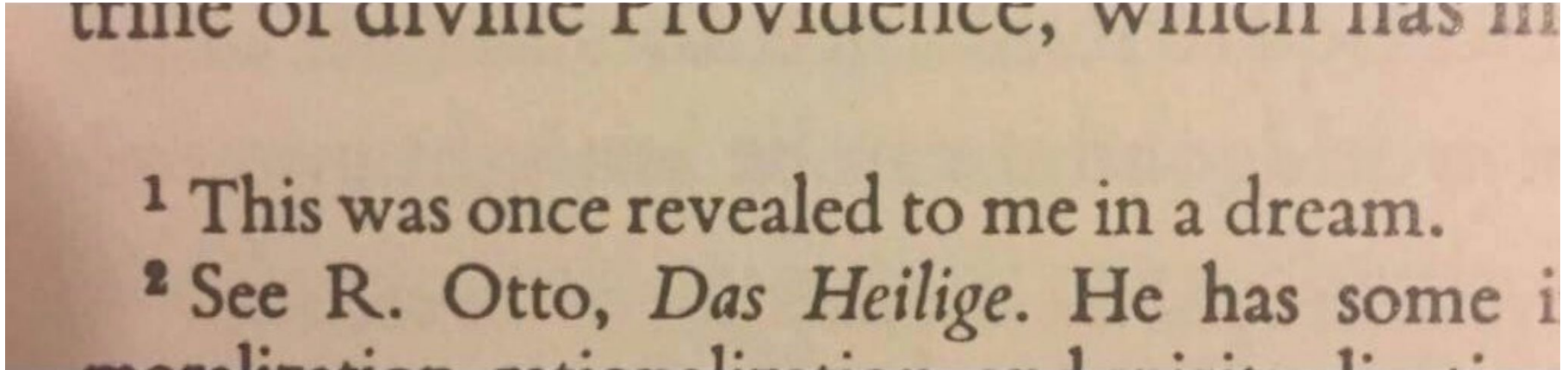
Prior Work

Prior work (art) is work you build on

- You need it to perform your work
- You need readers to understand so they can understand your work

Prior work does not compete with yours

Not Appropriate Prior Work



Relevant Work (Trad. Related Work)

Relevant work is related in that

- It may have attempted the same as your work
- It may have gone alternative ways

You need to **compare-and-contrast** to show the relationship and difference

- You **compare** to show how you relate
 - If the work is not related, it is irrelevant to your paper
- You **contrast** to show how are different
 - If not different from yours, your work is not novel

Presentation Structure

You should structure related work by

- Domains first
 - Application domain, technical domain, etc.
- Then specialize within domain
 - From the more general to the more specialized work

6. Research Design

The research design section

- Presents your research design, methods employed, etc.
- Serves to convince reviewers and readers of (sufficient) rigor of work

The section is also known as

- Approach or
- Methods

The specifics depend on your research design

7. Research Results

The research results section

- Presents the data you gathered, the results you derived
- Convinces the reviewers and readers of relevance of your work

The specifics also depend on your research design

8. Discussion

The discussions section

- Discusses your research results
- Establishes (beyond the results section) their quality

The specifics depend on the type of research

In qualitative research, also often called discussion and limitations

- Qualitative research needs
 - Two separate sections, one interpreting research results and one on
 - Limitations based on qualitative research quality criteria

In quantitative research, also often called threats to validity

- Quantitative research needs
 - Less of a discussion section past the results section but most certainly a

Structure of Limitations / Threats to Validity

Break down by relevant quality criterion

- Feel free to choose relevant criteria beyond the core four

You should always put weaknesses / challenges into context

- Explain their consequences

9. Conclusions

In the conclusions section you should

- Reiterate the main contributions and their significance

Some readers jump from abstract to conclusions directly

Skip any outlook on future work that is on your mind

10. Acknowledgments

List all people and thank them who made a contribution that was relevant but

- Not enough to make them an author of the article

11. Literature References

A literature reference is

- A lookup key for the literature references section that
- Identifies one entry of literature in the references section

The literature references section

- Contains the literature referenced in your article
- Each entry identifies one piece of external literature

If it contains additional recommended (not referenced) literature

- It is called a bibliography

Common Formats for Literature References

Three common forms for a reference (key) to the literature (value)

Reference (key)	Referenced entry (value)
[27]	Spector, A. Z. 1989. Achieving application requirements. In Distributed Systems, S. Mullender, Ed. ACM Press. ACM, New York, NY, 19-33.
[Spe89]	Spector, A. Z. 1989. Achieving application requirements. In Distributed Systems, S. Mullender, Ed. ACM Press. ACM, New York, NY, 19-33.
Spector, A. Z. (1989).	Achieving application requirements. In Distributed Systems, S. Mullender, Ed. ACM Press. ACM, New York, NY, 19-33.

3. Final Research Theses

The Structure of Final Research Theses

There are two main options for the structure of final research theses

1. You follow the research article structure and blow it up to thesis size
2. You write a research article and then complement it with detail material

In the second case,

- The first part should have research article size e.g. ten pages
- The second part should contain the material that usually goes into a technical report

4. Academic Writing

First Rule of Successful Writing

First and foremost rule

- Know your audience

Further best practices

1. Be brief and concise
2. Use active voice
3. Avoid weak wording
4. Avoid imprecise wording

Be Brief and Concise

(Attributed to) Mark Twain (November 30, 1835 – April 21, 1910):

“I didn’t have time to write a short letter, so I wrote a long one instead.”

Strunk and White (1918):

“Omit needless words.”

The internet (around 2015):

“tl;dr”

Example on Being Brief

Before:

“It is suggested to remove any dependency on prerequisite 3 in this experiment to not unduly restrict any possible outcome.”

After:

“It is suggested to remove any dependency on prerequisite 3 to not unduly restrict the outcome.”

Example on Being Concise

Before:

“It is suggested to remove any dependency on prerequisite 3 to not unduly restrict the outcome.”

After:

“It is suggested to remove requirement 3.”

Use Active Voice

Passive voice is

- Unnecessarily lengthy
- Often hides the actor

Example of Using Active Voice

Before:

“It is suggested to remove requirement 3.”

After:

“Drop requirement 3.”

Avoid Weak Wording

Weak wording

- “We tried to...” (So what?)
- “We believe...” (OK, why?)

“Try not. Do or do not. There is no try.”

Avoid Imprecise Wording

Imprecise wording

- “Very efficient...” (How efficient?)
- “Many occurrences...” (How many?)

Don't leave your reader guessing

All Rules Break Down, Eventually

“A veterinarian prescribed antibiotics Monday for a camel that lives behind an Iberville Parish truck stop after a Florida woman told law officers she bit the 600 pound animal’s genitalia after it sat on her when she and her husband entered its enclosure to retrieve their deaf dog.” [1]

Summary

1. The research paper
2. Sections of a research paper
3. Final research theses
4. Academic writing

Thank you! Any questions?

dirk.riehle@fau.de – <https://oss.cs.fau.de>

dirk@riehle.org – <https://dirkriehle.com> – [@dirkriehle](https://twitter.com/dirkriehle)

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