

Communication in Computer Science

Structure and Interpretation of Scientific Titles

Olivier Danvy

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Your title

- subject and predicate
- the spearhead of your paper

Your title: subject and predicate

Subject: the topic of your work.

Predicate: your spin on this topic.

Your title: subject and predicate

Subject: the topic of your work.

Predicate: your spin on this topic.

For example: “**Good Teaching**”

“**An Optimizing Compiler**”

“**Improved Bounds**”

“**Imaginary Numbers**”

“the λ **calculus,**” etc.

Your title: the spearhead of your paper

Fact: one's first impression is about **the form**,
not about **the content**.

Your title: the spearhead of your paper

Fact: one's first impression is about **the form**,
not about **the content**.

Muddled form suggests muddled content:
if it looks bad, it is probably bad.

Bad form, good form, and content

Bad form **does not** force the critical reader
to look at the content.

Bad form, good form, and content

Bad form **does not** force the critical reader
to look at the content.

Good form **does**.

Form matters

For titles:

Use line breaks to support your message.

Typical slide with a bad line break

A long time ago in a galaxy far,
far away....

With a better line break

A long time ago

in a galaxy far, far away....

With a better line break

A long time ago

← when

in a galaxy far, far away....

← where

With a better line break,
with an extra comma

A long time ago,
in a galaxy far, far away....

With a better line break,
with an extra comma,
and with a proper ellipsis

A long time ago,
in a galaxy far, far away...

With a better line break,
with an extra comma,
and with a proper ellipsis

A long time ago,
in a galaxy far, far away...

(I too find this lack of grammar disturbing.)

Title with unresponsive line breaks

Implicit and Explicit Aspects of Scope and
Block Structure

Implicit and
Explicit Aspects of Scope and Block
Structure

Title with supportive line breaks

Implicit and Explicit Aspects
of
Scope and Block Structure
Ulrik Pagh Schultz (1997)

Rise from the anecdote to the principle

Don't stop at the “**how**”: seek the “**what**”.

- The “**how**” of Ulrik's thesis is **λ -lifting** and **λ -dropping** (i.e., two program transformations).
- The “**what**” of Ulrik's thesis is **lexical scope** and **block structure**.

Rise from timeliness to timelessness

What was considered modern not so long ago
is terribly passé today.

Rise from timeliness to timelessness

What was considered modern not so long ago
is terribly passé today.

“Fashion is what goes out of fashion.”

– Coco Chanel

Aristotle's four causes again

Material cause: what is the object of discourse?
what are we talking about?

Efficient cause: what is done to it / who does it?

Formal cause: which methods are used to do that?

Final cause: towards what use / what goal?
why is this done?
what for / pourquoi / hvorfor?

The four causes at NUS (1/3)

A Fast Algorithm
for Scheduling Instructions
with Deadline Constraints
on RISC Processors

Hui Wu, Joxan Jaffar, Roland Yap (2000)

A Fast Algorithm
for Scheduling Instructions
with Deadline Constraints
on RISC Processors

Material cause: the RISC instructions

Efficient cause: the algorithm

Formal cause: the deadline constraints

Final cause: scheduling instructions rapidly

The four causes at NUS (2/3)

Achieving
High-Bandwidth Peer-to-Peer Data Transfers
with the Right Incentives
in Heterogeneous Environments

Cristina Carbunaru,
Ben Leong, Yong Meng Teo (2015)

Achieving
High-Bandwidth Peer-to-Peer Data Transfers
with the Right Incentives
in Heterogeneous Environments

Material cause: peer-to-peer data transfers

Efficient cause: handling the heterogeneity

Formal cause: the right incentives

Final cause: transferring data efficiently

The four causes at NUS (3/3)

Nested Reachability Approximation
for Discrete-Time Markov Chains
with Univariate Parameters

Guoxin Su, David Rosenblum (2014)

Nested Reachability Approximation for Discrete-Time Markov Chains with Univariate Parameters

Material cause: discrete-time Markov chains

Efficient cause: an approximation

Formal cause: the univariate parameters

Final cause: the nested reachability

Exercise #1

Find titles in your research area
that reflect the four causes
(not all titles do)
and indent them accordingly.

Common patterns in scientific titles

- **Just the facts**: noun | adjective noun
- **Qualification**: X of Y
- **Enumeration**: X and Y | X, Y, and Z
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...an empirical taxonomy.

Just the facts: X

Linear Logic (Girard, 1987)

Binding Time Analysis (Jones, 1991)

The Zipper (Huet, 1997)

Qualification: X of Y

The Lord of the Rings (Tolkien)

The Calculi of Lambda-Conversion (Church)

Principles of Programming Languages (POPL)

Enumeration: X and Y

Romeo and Juliet (Shakespeare)

Word and Object (Quine)

There and Back Again (e.g., Tolkien)

Communication and Concurrency (Milner)

Enumeration: X, Y and Z

Me, myself and I (Tenn, 1947)

Call-by-name, call-by-value and the λ -calculus
(Plotkin, 1975)

Automata, Languages and Programming
(ICALP)

The serial comma

Dilemma:

- is it “X, Y, and Z” (with a last comma)
- or “X, Y and Z” (with no last comma)?

Grammarians are divided.

Whatever your choice, **be consistent about it.**

The Oxford comma in acknowledgments

Thanks are due to my companions of misery
in the lab, our sysadmin and the pizza guy.

vs.

Thanks are due to my companions of misery
in the lab, our sysadmin, and the pizza guy.



The Oxford comma in acknowledgments

Thanks are due to my companions of misery
in the lab, our sysadmin and the pizza guy.

vs.

Thanks are due to my companions of misery
in the lab, our sysadmin, and the pizza guy.



(The pizza guy, a companion of misery?)

More acknowledgments (1/3)

Thanks are due to my two PhD supervisors,

Ganesha (god of wisdom

and remover of all obstacles)

and

Saraswati (goddess of knowledge and the arts).

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Thanks are due to my two PhD supervisors,

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and

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You had gods as PhD supervisors?

More acknowledgments (2/3)

Thanks are due to my two PhD supervisors,

Ganesha (god of wisdom

and remover of all obstacles), ←

and

Saraswati (goddess of knowledge and the arts).

disambiguation

More acknowledgments (3/3)

Thanks are due to my two PhD supervisors

and to Ganesha (god of wisdom

and remover of all obstacles)

and

Saraswati (goddess of knowledge and the arts).

simplification

Enumeration + qualification:
(A, B, and C) of D

Transformation, Analysis, and Interpretation
of
Higher-Order Procedural Programs

Jan Midtgaard (2007)

Empowerment: X **for** Y

Procedural Content Generation
for
Multiplayer Games

Anand Bhojan (2013-2015)

Empowerment: X **for** Y

Procedural Content Generation
for
Multiplayer Games

Anand Bhojan (2013-2015)

Many (most?) titles at NUS use empowerment.

Empowerment: X **from** Y

Text Extraction **from** Document Images

Chew Lim TAN (1999)

Empowerment: X **from** Y

Text Extraction **from** Document Images

Chew Lim TAN (1999)

Effective Location Identification

from

Microblogs

Guoliang Li, Jun Hu, Jianhua Feng,
Kian-Lee Tan (2014)

Empowerment: X **with** Y

Compiling **with** Continuations

Andrew Appel (1992)

Empowerment: X **in** Y

Logic **in** Computer Science (LICS)

Logical Methods **in** Computer Science (LMCS)

Lecture Notes **in** Computer Science (LNCS)

Empowerment + enumeration:

X **by** (Y **and** Z)

Program Validation

by

Symbolic **and** Reverse Execution

Jooyong Lee (2007)

Enumeration + qualification:

(X and Y) of Z

Principles and Practice

of

Declarative Programming

(PPDP)

Action: doing X

Constraining Control

Abstracting Control

Representing Control

Handling Control

Extending Control, etc.

Calculating sized types (Khoo & Chin, 2001)

Action too: X doing

Machine Learning

Domain Engineering (Bjørner, 2008)

Substantiation + empowerment:

A: B for C

Chronos:

A Timing Analyzer for Embedded Software

Xianfeng Li, Yun Liang,
Tulika Mitra, Abhik Roychoudhury (2007)

Substantiation + empowerment + action:

A: B **for** doing C

DARWIN:

An Approach **for** Debugging Evolving Programs

Dawei Qi, Abhik Roychoudhury,
Zhenkai Liang, Kapil Vaswani (2009)

Substantiation + action + empowerment:

A: doing B with C

PODARCH:

Protecting Legacy Applications

with a Purely Hardware TCB

Shweta Shinde, Shruti Tople,
Deepak Kathayat, Prateek Saxena (2015)

Mememes

- X considered harmful
- L: the ultimate M
- On Z
- etc.

Do you know the origin of these mememes?

Answer

- [Go To Statement Considered Harmful](#),
Dijkstra, CACM 1968
- Steele and Sussman's series of papers
[Lambda the Ultimate](#), MIT AI Lab, 1976-1978
- “On ...” is a translation from the Latin “De ...”
(e.g., “De Viris Illustribus Urbis Romae”).
It means “About / regarding something”.

Recommendations

Seek **linear, one-pass titles.**

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Don't pile up adjectives and nouns,
unless you are a pro:
they are much harder to read.

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unless you are a pro:

they are much harder to read.

Plus, you are writing in English, not in German.

Which version is easier to read? (1/2)

Which version is easier to read? (1/2)

A new

Which version is easier to read? (1/2)

A new concurrent

Which version is easier to read? (1/2)

A new concurrent asymptotically

Which version is easier to read? (1/2)

A new concurrent asymptotically
efficient

Which version is easier to read? (1/2)

A new concurrent asymptotically
efficient binary

Which version is easier to read? (1/2)

A new concurrent asymptotically
efficient binary code

Which version is easier to read? (1/2)

A new concurrent asymptotically
efficient binary code generator

Which version is easier to read? (1/2)

A new concurrent asymptotically
efficient binary code generator

or

Which version is easier to read? (1/2)

A new concurrent asymptotically
efficient binary code generator

or

A new generator

Which version is easier to read? (1/2)

A new concurrent asymptotically
efficient binary code generator

or

A new generator of binary code

Which version is easier to read? (1/2)

A new concurrent asymptotically
efficient binary code generator

or

A new generator of binary code
that is concurrent

Which version is easier to read? (1/2)

A new concurrent asymptotically
efficient binary code generator

or

A new generator of binary code
that is concurrent and asymptotically efficient

Which version is easier to read? (1/2)

A new concurrent asymptotically
efficient binary code generator
(piled-up adjectives, random line break)

or

A new generator of binary code
that is concurrent and asymptotically efficient

Which version is easier to read? (1/2)

A new concurrent asymptotically
efficient binary code generator
(piled-up adjectives, random line break)

or

A new generator of binary code
that is concurrent and asymptotically efficient
(linearized title, logical line break)

Which version is easier to read? (2/2)

LE GRAND SCHTROUMPF:

A Bluetooth-based distributed syntax
directed compiler generating framework

Smurfin' USA:

A distributed framework based on Bluetooth
for generating syntax-directed compilers

Which version is easier to read? (2/2)

LE GRAND SCHTROUMPF:

A Bluetooth-based distributed syntax
directed compiler generating framework
(piled-up adjectives, random line break)

Smurfin' USA:

A distributed framework based on Bluetooth
for generating syntax-directed compilers
(linearized title, logical line break)

Where is the adjective? (1/3)

Hyphenate to disambiguate:

graphical user interface, or
graphical-user interface?

- is it the user interface that is graphical?
(then don't put a hyphen: "graphical user")
- or is this the interface of a graphical user?
(then put a hyphen: "graphical-user")

Where is the adjective? (2/3)

Hyphenate to disambiguate:

data flow analysis, or
data-flow analysis?

- is it the flow analysis that is data?
(then don't put a hyphen: "data flow")
- or is this the analysis of a data flow?
(then put a hyphen: "data-flow")

Where is the adjective? (3/3)

Hyphenate to disambiguate:

high stakes poker, or
high-stakes poker?

- is it the stakes poker that is high?
(then don't put a hyphen: "high stakes")
- or is this the poker having high stakes?
(then put a hyphen: "high-stakes")

But common practice is not logical...

Exercise #2

Find **common composite terms**,

and disambiguate them with a hyphen, or not:

bottom up parsing,

compacting garbage collector,

discrete time Markov chains,

elastic MapReduce execution,

dynamic transition compression,

binary code generator,

trusted computing base,

etc.

Exercise #3: analyze existing titles at NUS

- **Just the facts**: noun | adjective noun
- **Qualification**: X of Y
- **Enumeration**: X and Y | X, Y, and Z
- **Empowerment**: X {for | with | using | in} Y
- **Action**: doing X
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Titles with subtitles

Often, the title is a Socratic question, an idiom, an aphorism, a proverb, or a famous quote (misquoted if need be, to make a point).

The subtitle then clarifies the title and contains the technical meat of the paper.

Exercise #5: find titles with subtitles at NUS

Hint: look at the home pages of the senior staff,
for Socratic questions require maturity.

Funny titles? (1/3)

As a young author, avoid funny titles:

- they grow old so quickly, and
- they won't look funny at all in your CV when you apply for a job in the future.

Funny titles? (2/3)

Funny titles tend to be uninformative, and you want people to read your paper, don't you?

Funny titles? (3/3)

Funny titles are about **the messenger**,
but titles should be about **the message**,
and the message should stand
after the messenger has left.
(Otherwise, nobody will cite your paper.)

Clever titles?

Cleverness is good, as long as

- it assists or even propels your message, and
- it does not occult it.

Example:

Ad-hoc Global Constraints for Life

Kenil Cheng, Roland Yap (2005)

This paper is about Conway's Game of Life.

Clever titles?

Cleverness is good, as long as

- it assists or even propels your message, and
- it does not occult it.

Example (an amusing double entendre):

There's No Substitute for Linear Logic

Phil Wadler (1991)

Substitute is actually a technical term here.

Canonical recommendation

Your title should be {
accurate,
simple,
punchy, and
memorable.

Canonical recommendation

Your title should be {
accurate,
simple,
punchy, and
memorable.

Its form should support its content: indentation, cadence, and (if possible) alliteration.

Candid reaction (with horse sense)

Thank you for leading me to the water.

Candid reaction (with horse sense)

Thank you for leading me to the water.

I probably can find “alliteration” in Wikipedia,

Candid reaction (with horse sense)

Thank you for leading me to the water.

I probably can find “alliteration” in Wikipedia,
but this water,

Candid reaction (with horse sense)

Thank you for leading me to the water.

I probably can find “alliteration” in Wikipedia,
but this water,
how do I drink it exactly?

0.0

Application to your thesis work

Application to your thesis work

- What are your data?

Application to your thesis work

- What are your data?
(make a list of answers)

Application to your thesis work

- What are your data?
(make a list of answers)
- What do you do to them?

Application to your thesis work

- What are your data?
(make a list of answers)
- What do you do to them?
(make a list of answers)

Application to your thesis work

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Application to your thesis work

- What are your data?
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- What do you do to them?
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(make a list of answers)
- And you do all of this for / towards what?

Application to your thesis work

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- What are your data?
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(make a list of answers)
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(make a list of answers)

(You might need to backtrack at every step.)

Composing the title of your dissertation

Streamline the lists and connect them:

Composing the title of your dissertation

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- **Just the facts:** noun | adjective noun

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- **Action**: doing X {for | with | using | in} Y

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etc.

And at the end of the day

- Short is good but informative is better:
if your title doesn't fit in one line,
insert a logical line break.
- But then remain vigilant:
an enterprising copy editor might remove it
in the published version...

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Thank you and good luck.