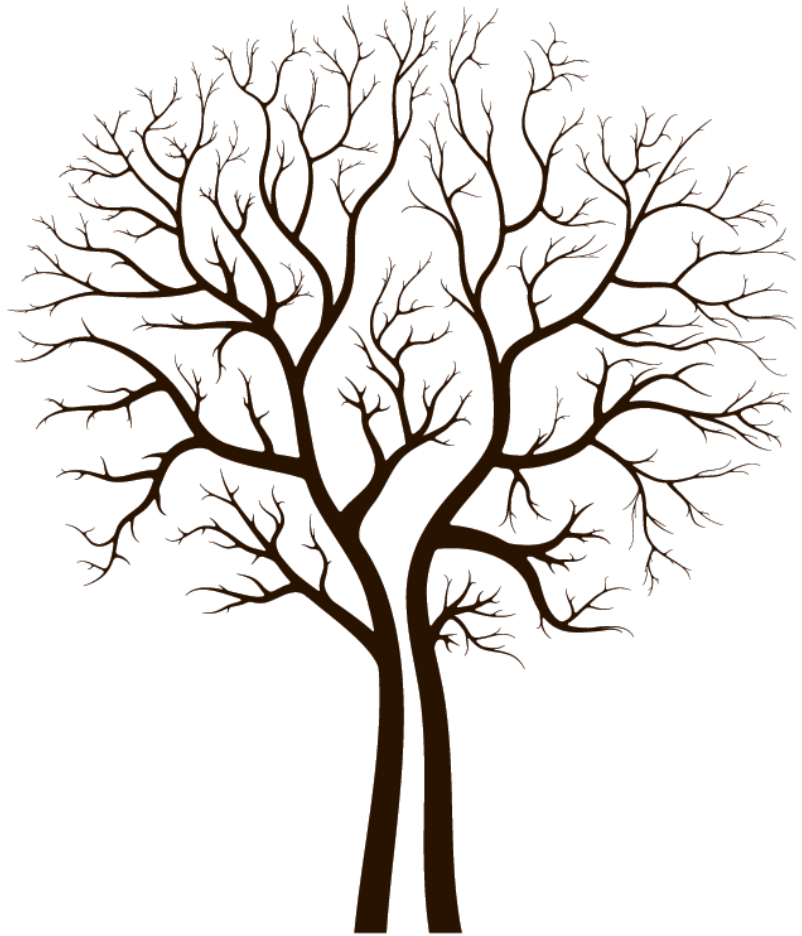


# Paper Structure

- Title = face
- Abstract = heart
- Key Words = address
- Headings = skeleton
- Introduction = hands
- Data and Analysis
- Discussion
- Visuals = voice
- Conclusion = smile
- References



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**First impression**

Today, as the city's bowels demonstrate their usual constipation, the pouring rain adds a somewhat slimy aspect to the slow procession of traffic. Professor Leontief does not like arriving late at the lab. He hangs his dripping umbrella over the edge of his desk, at its designated spot above the trashcan, and he gently awakens his sleepy computer with some soothing words: "Come on, you hunk of metal and silicon oxide, wake up."

He checks his electronic mail. The third e-mail is from a scientific journal which he helps out as a reviewer. "Dear Professor Leontief, last month you kindly accepted to review the ...." He need not read any further. He looks at his calendar, and then feels the cold chill of panic run up his spine when he realises that the deadline is only 2 days away. He hasn't even started. So much to do with so little time! Yet, he cannot postpone his response. Being a resourceful man, he makes a couple of telephone calls and reorganises his work schedule so as to free up an immediately available 2-hour slot.

He pours himself a large mug of coffee, and extracts the article from the pile of documents pending attention. He goes straight to the reference section on the last page to check if his own articles are mentioned. He grins with pleasure. As he counts the pages, he looks at the text density. It shouldn't take too long. He smiles again. He then returns to the first page to read the abstract. Once read, he flips the pages forward slowly, taking the time to analyse a few visuals, and then moves to the conclusions, reading them with great care.

*(Continued)**(Continued)*

He stretches his shoulders and takes a glance at his watch. Twenty minutes have gone by since he started reading. By now, he has built a first and strong impression. Even though the article is of moderate length, it is too long for the depth of the proposed contribution. A letter would have been a more appropriate format than a full-fledged paper. Poor researcher. He will have to say this, using diplomatic skills so as not to be discouraging, for he knows the hopes and expectations that all writers share. What a shame, he thinks. Had he accepted the paper, his citation count would have increased. Now the hard work of thorough analysis lies ahead. He picks up his coffee mug and takes a large gulp.

The first impression of a paper is formed after a partial reading. During the first 20 minutes or so, a reviewer does not have time to read the whole paper, in particular the methodology and the results/discussion sections. I have therefore decided to cover in part II only those parts of a paper that are read during the rapid time in which the first impression is formed. This decision was also based on comments from scientists who have published many papers. They stated that the methodology and results sections of their paper were the easiest and fastest to write, but it was the other parts that were difficult and took time: the abstract, introduction, and conclusions. As for the title, structure, and visuals, they recognised that they had underestimated the key role these parts play in creating the first impression.

The impact of the quality of these parts goes beyond creating a favourable first impression for the reviewer and reader. Improved

# Title --- How to select one

Try alternative titles ...

- What are the differences
- Pair elimination
- The best one should be tempting and informative
- Author's contribution should come first

# Title (cont.)

- The title is not read; it is scanned, within 2 seconds at most
- A long easily understood title *is better than* a short one with nouns to be unpacked, *which in turn is better than* an ambiguous one
- An old or popular subject → a longer title in order to specify the contribution

# Six Techniques to improve titles

## 1. Placement of Contribution First

For a full sentence, the new information usually appears at the end and the old information at the beginning.

In a verbless title, however, the situation is reversed.

## 2. Using Verbal Forms

A verb gives energy. So use gerunds (動名詞) or infinitives (不定詞) to energize your title.

For example:

**Data learning: Understanding astronomical  
Data**

### **3. Using Adjectives or Numbers to Stress contribution**

Fast, highly efficient, robust, but not new or novel

The most specific, the better, e.g., 5 Hz sampling *is better than* fast sampling

### **4. Clear and Specific Keywords**

Easier to locate by a search engine or database



## 5. Smart Choice of Keywords

Pick your keywords from recent or often-cited titles close to your contribution

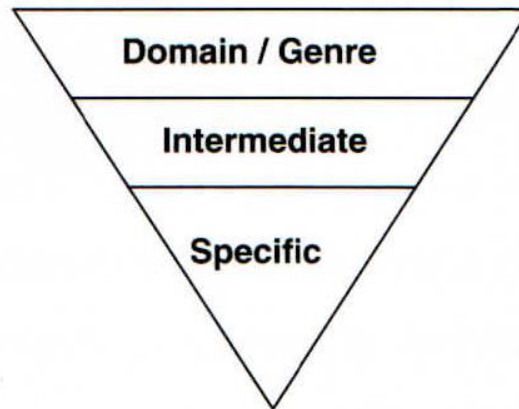
→ searches to retrieve those will also find yours

If two keywords are equally good, choose one for the title and the other for the abstract.

## 6. Catchy Acronyms

MACHO, TAOS

**General — breadth**



**High frequency**

**Specific — depth**

**Low frequency**

☛ **1. Keyword depth and breadth.** Specialised keywords are at the pointed lower end of the inverted triangle. General keywords are at the broad top end of the triangle. The general-to-specific scale correlates with the frequency of use of a scientific keyword. Depth and breadth of a keyword are not intrinsic qualities, but rather depend on the frequency of use of these words in the journal that publishes the paper. For example, the reader of *Science* may consider “nanopattern” very specific, yet the reader of the *Journal of Advanced Materials* will find it quite generic. The reader’s knowledge also influences the perception of keyword levels: the less knowledgeable the reader is, the more the general keywords will seem specific, and vice versa.

*network*) are useful to describe the domain or the type of your work/paper, but they have very little differentiating power precisely because they frequently appear in titles. They do not help to place your title at the top of the reader's list. Intermediate keywords are better at differentiating. They are usually associated with methods common to several fields of research (*fast Fourier transform, clustering, microarray*) or to large subdomains (*fingerprint recognition*). But, for maximum differentiation, specific keywords are unbeatable (*hypersurface, hop-count localisation, nonalternative spliced genes*). For a given journal, or for domain experts, the category of a keyword is well defined. It changes from journal to journal, or from experts to nonexperts.

Make sure your title has keywords at more than one level of the triangle. If too specific, your title will only be found by a handful of experts in your field; it will also discourage readers with a sizeable knowledge gap. If too general, your title will not be found by experts. The keyword choice decision is yours. Be wise.



So a good title should be

unique, lasting,  
concise, clear, easy to  
find, honest and  
representative, and (if  
possible) catchy

A question for the title?

#### Catchy title . . . but how?

Here are seven proven ways:

- (1) Adjectives are attractive.
- (2) Some keywords carry the passion of the time. Encountering them in titles excites the reader who is keen to keep up to date with the latest happenings in science.
- (3) Verbal forms (gerundive and infinitive) are more active and potent than strings of nouns connected by prepositions.
- (4) A shorter title is more attractive than a long one, and a general title is more attractive than a specific one.
- (5) Words that announce the unexpected, the surprising, or the refutation of something well established all fuel the curiosity of the reader.
- (6) Unusual words that belong to a different lexical field intrigue the reader.
- (7) Questions are great, but are often reserved for the few who have reached professorship or Nobel Prize status.

To make a title catchy, there is only one rule: catchy, yes; dishonest, no.



What do you think of your title? Does it have enough of the qualities mentioned here? Is your contribution featured at the head of your title? It is time to have a closer look.

HW: Let us be critical ...

Select 10 titles from the latest  
ApJ issue. Do the same for 10 titles  
in RAA.

What is the title you have come up  
with for your thesis/paper? Bring it  
to our discussion.

# A paper I am writing now ...

## A POSSIBLE DETECTION OF OCCULTATION BY A PROTO-PLANETARY CLUMP IN GM CEPHEI

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*Draft version November 29, 2011*

### ABSTRACT

GM Cep in the young ( $\sim 4$  Myr) open cluster Trumpler 37 has been known to be an abrupt variable and to have a circumstellar disk with very active accretion. Our monitoring observations in 2009–2011 revealed the star to show sporadic flare events, each with amplitude  $\lesssim 1$  mag lasting for about 10 days. These brightening events were associated with a bluing color, and could be accounted for by increased accretion activity. Moreover, the star also underwent a brightness ditch of  $R \sim 1$  mag lasting for about a month, during which the star became bluer. This ditch seems to have a recurrence time scale of a year, as evidenced in our data and the photometric behavior of GM Cep over a century long. Between consecutive ditch events, the star experienced a gradual brightening and fading of an amplitude of 1 mag, during which the star became blue at peak luminosity. It is hypothesized that the ditch is caused by obscuration by an orbiting concentration of circumstellar dust. GM Cep therefore exhibits both the EX Lupi type and UX Orionis type activity, and appears to have undergone the inhomogeneity process in transition between grain coagulation and planetesimal formation in a young circumstellar disk.

*Subject headings:* Occultations — Planets and satellites: formation — Protoplanetary disks — Stars: Individual: GM Cep — Stars: pre-main sequence — Stars: variables: T Tauri, Herbig Ae/Be



# **Abstract** --- the heart of your paper

Chapter 11 of Jean-Luc Lebrun

- ◆ What does a reader expect to see in an abstract?
- ◆ What do you expect to see as a reader?

# Four parts of an abstract

- **What**

- What is the problem? What is the topic of this paper?

- **How**

- How is the problem solved (methodology)?

- **Results**

- What are the specific results? How well is the problem solved? Visuals in abstracts?

- **Impact**

- So what? How useful is this to science or to the reader?

Very often, the fourth part (impact) is missing, because

- The maximum number of words allowed by the journal ran out too quickly with a long rambling start.
- The author (mistakenly) considered that the results should speak for themselves.
- The author was not able to assess the impact of the scientific contribution.

*“a result of the myopia caused by the atomization of research tasks among many researchers”*

見樹不見林

- The parts with the largest number of words  
= contribution
- Adjectives ok in the title, but precision in the abstract
- Coherence between abstract and title
- 30%~80% (i.e.,  $> 1/3$ ) significant title words are in the first sentence of the abstract. There are exceptions, but usually at least there should be one word from the title. Otherwise, sentences 2 and 3 mention most of the other title words.
- The first sentence should expand, not just repeat, the title.

- All title words should be in the abstract. Otherwise, why does a word deserve a “title” status of your paper? One exception is using an alternative, interchangeable keyword in the field → to increase the chance of being found by search engines.
- If a title word is not important, remove it.
- If a title word is missing in the abstract and is important, put it in.
- If the abstract contains a keyword that should be in the title, rewrite the title to incorporate that keyword.

- The abstract needs to set the problem, but does not need to justify why it is important (the introduction does that.) The abstract, however, needs to justify the significance of the results.
- The abstract should **NOT** (1) mention the work of other researchers (it is done in the introduction), unless the paper is an extension of a previous paper; (2) why the problem is important (also the role of the introduction). The abstract should concentrate on the **importance of the results.**