

BLG 374E

Technical Communication for Computer Engineers

Week 2

Eliminating Noise in Engineering Writing-II

Lecture Notes

I'll be using lecture notes prepared by earlier instructors, including Esbie van Heerden, Damien Jade Duff, and probably others (though I may revise them).

Parallelism: respect it

PARALLELISM

Parallelism refers to the need for items in a list to share the same grammatical structure.

After a lot of discussion, the team concluded that their alternatives were to call in a consultant, thus increasing the cost of the project, or having three more engineers reassigned to the team.

... to call in a consultant ... or to have three more engineers reassigned ...

Parallelism: respect it

The back-up system should be efficient, should meet safety specifications, and have complete reliability.

?



The back-up system should be efficient, should meet safety specifications, and should be completely reliable.

The back-up system should be efficient, meet safety specifications, and be completely reliable.

Sentence fragments sound funny and introduce ambiguity.

FRAGMENTS

Sentence fragments are partial statements that create noise because they convey an incomplete unit of information. Here's an example:

She decided to major in petroleum engineering. Even though it would take five years.

The first sentence makes sense by itself. Try saying the second statement alone, as an independent exclamation, and your listeners will be lost.

She decided to major in petroleum engineering, even though it would take five years.

Sentence fragments sound funny and introduce ambiguity.

Nearly 60 percent of U.S. households had VCRs by the end of the 1980s. In spite of the microwave oven being the most popular appliance of the decade.



In spite of the microwave oven being the most popular appliance of the 1980s, nearly 60 percent of U.S. households had VCRs by the end of the decade.

Sentence fragments sound funny and introduce ambiguity.

Fragment: Delays in the October shipments have occurred. Due to the strike.

Complete: Delays in the October shipments have occurred due to the strike.

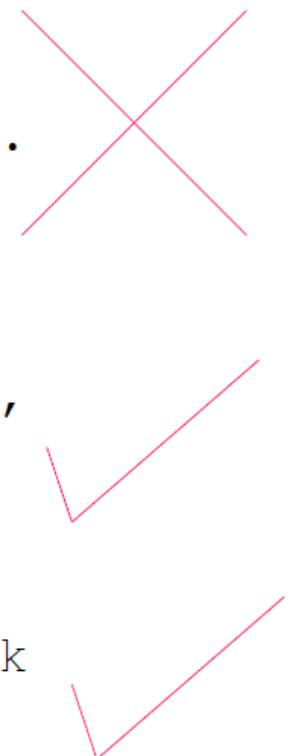
Better: The strike has delayed the October 6 shipments.

or

The October 6 shipments have been delayed by the strike.

Sentence fragments sound funny and introduce ambiguity.

- We should all try to rethink our unconscious assumptions about colleagues. Because we do not know what they have experienced.
- We should all try to rethink our unconscious assumptions about colleagues, because we do not know what they have experienced.
- Because we do not know what they have experienced, we should all try to rethink our unconscious assumptions about colleagues.



When to use active voice and passive voice

ACTIVE OR PASSIVE VOICE?

The active voice directly states that someone does something, as in *The engineer wrote the report*. The passive voice turns it around to *The report was written by the engineer*. Thus the active voice emphasizes the performer of the action—the engineer, in our example—while the passive emphasizes the recipient of the action, the report.

When to use active voice and passive voice

- Use passive voice when:
 - Nobody cares about the actor.
 - ✓ • *P: Algorithm implementations have been constantly tuned over the years.*
 - ✗ • *P: Algorithm implementations have been constantly tuned over the years, by people.*
 - ✗ • *A: People have constantly tuned algorithm implementations over the years.*

When to use active voice and passive voice

- Use passive voice when:
 - It is so general the actor is irrelevant.
 - ✓ • *P: Linear time algorithms are desired.*
 - ✗ • *P: Linear time algorithms are desired, by people.*
 - ✗ • *A: People desire linear time algorithms.*

When to use active voice and passive voice

- Use passive voice when:
 - We don't want to accentuate the actor:

Chances are management would rather tell you *It has been decided to terminate your employment* than *We have decided to fire you*. (Perhaps such hedging is necessary at times since it helps conceal responsibility and gives us no one to blame!)

When to use active voice and passive voice

- Use the active voice when:
 - Giving instructions:
 - A: *Run the program.*
 - P: *The program should be run.*
 - Simplicity is better:
 - P: *It is shown in the results that quicksort is outperformed by merge sort on this particular data-set.*
 - A: *The results show that merge sort outperforms quicksort on this particular data-set.*

When to use active voice and passive voice

Sometimes the passive will give variety to your writing, even if your inclination is to write predominantly in the active voice:

Computer experts claim that general-purpose processors have unpredictable execution times due to their use of complex architectural features. This conjecture has now been tested by our group and we have found that the architecture really induces little or no unpredictability. Moreover, data gained from our study show how the execution times can be predicted. It was also found that ...

As opposed to, «Our group tested this conjecture ...», and «Moreover, our data show ...»

When to use active voice and passive voice

In spite of the passive's usefulness, however, the natural form of the English sentence is usually the active voice. This form generally tends to be the more efficient.

Control of the flow is provided by a DJ-12 valve.

A DJ-12 valve controls the flow.

A system for delineating these factors is shown in Figure 5.

Figure 5 shows a system for delineating these factors.

By switching off the motor when it started to vibrate and looking at the tachometer, the resonant frequency was determined.

We determined the resonant frequency by switching off the motor when it started to vibrate and looking at the tachometer.

When to use active voice and passive voice

The passive can become especially burdensome in procedures or instructions:

The button is pressed twice.

vs.

Press the button twice.

Previously entered data in the DataBase is eliminated by the Edit menu being opened and Select All being chosen.

vs.

Eliminate previously entered data in the DataBase by opening the Edit menu and choosing Select All.

When to use active voice and passive voice

- Use the easiest and most flowing one.

But, your company may expect its employees to use the PASSIVE voice whenever possible. Be aware of whether that is the case!

Gender-Neutral Language

Restrictive: *Every engineer should be at his workstation by 9 A.M.*

Inclusive: *Every engineer should be at his or her workstation by 9 A.M.*
 or (preferred because less wordy):
 Engineers should be at their workstations by 9 A.M.

Restrictive: *An employee can expect a lot of challenges during his career here.*

Inclusive: *Employees can expect a lot of challenges during their careers here.*

Restrictive: *Every technician must wear safety glasses when he enters the work area.*

Inclusive: *Technicians must wear safety glasses when entering the work area.*

Use plural whenever possible!

Gender-Neutral Language

There are traditionally male terms such as Chairman.

Nowadays it is often referred to as Chairperson:

The presiding officer of a meeting, organization, committee, or event

For a female, in place of Chairman, one can use Chairwoman, Chairperson, or simply Chair.

Sarah is chair of the new committee on marketing strategy.

or

Sarah is chairing the new committee on marketing strategy.

Prepositions Can End A Sentence

- ✓ • Figure 1 shows the dataset that the algorithm will be run **on**.
- ✓ • Figure 1 shows the dataset that the algorithm will be run **with**.
- ✓ • Figure 1 shows the dataset **on** which the algorithm will be run.
- ✓ • Figure 1 shows the dataset **with** which the algorithm will be run.
- ✗ • Figure 1 shows the dataset that the algorithm will be run.

Prepositions Can End A Sentence

Usually, the sentence flows better and is more natural when the preposition is placed at the end.

That's a problem on which we will really have to work.

That's a problem that we will really have to work on.

We must make sure we can find some engineering consultants on whom we can really count.

We must make sure we can find some engineering consultants we can really count on.

Never Split an Infinitive

“Never Split an Infinitive.” An infinitive is the form of a verb that combines with the word *to*, as in *to go*, *to work*, or *to think*.

To boldly go where no man has gone before!

To entirely separate the wires in a power line.

If you put too much material between *to* and the rest of the verb, noise or even nonsense might result:

The team has been unable to, except for the lead engineer and one technician who is on temporary assignment with us, master the new program.

Never Split an Infinitive

The team has been unable to, except for the lead engineer and one technician who is on temporary assignment with us, master the new program.



Except for the lead engineer and one technician on temporary assignment with us, the team has been unable to master the new program.

or

The team has been unable to master the new program—with the exception of the lead engineer and one technician who is on temporary assignment with us.

Transitions

Therefore, Thus, Similarly, Unfortunately, Nevertheless,
Even Though...

*The group's long-range plans for the S-34B project have been extended.
The completion date for the project is as originally planned.*



The group's long-range plans for the S-34B project have been extended.
Nevertheless, the completion date for the project is as originally planned.

The group's long-range plans for the S-34B project have been extended.
Unfortunately, the completion date for the project is as originally planned.

Even though the group's long-range plans for the S-34B project have been
extended, the completion date for the project is as originally planned.

Transitions

To indicate a sequence: *before ... later, first ... second, in addition, additionally, then, next, finally*

Before the project got under way, we felt we could never meet the deadline. Later, it became clear there was a realistic chance of doing so.

To indicate contrast: *but, however, yet, still, nevertheless, although, on the contrary, in contrast, on the other hand*

The GX-40 vehicle scored over 96% in initial dependability testing; nevertheless, the design was scrapped.

To indicate cause and effect: *consequently, therefore, so, thus, hence*

This company has had to downsize lately. Consequently, many of our staff are looking for other positions.

To indicate elaboration: *further, furthermore, for example, moreover, in fact, indeed, certainly, besides*

The automotive airbag has proved to be a major factor in driver survival. Moreover, the bag has generated considerable profits for its producers.

You need an good excuse for
a long sentence.

You should rarely write sentences over 20 words long.

We finally had a long discussion with the R & D staff but were not able to convince them that they should commit to a specific date for implementation of the design, but instead they responded with a proposal to extend the project, which would result in a lot more work for all of us and a considerable loss of profits for the company.

You need an good excuse for
a long sentence.

- Having run 5 algorithms and collected quantitative results from them all, and analysed these results carefully, considering both general trends and variance in the data, we have concluded that not only are the algorithms vastly different in terms of performance, but that this difference is reliably present despite other sources of randomness.

You need an good excuse for
a long sentence.

But do not use too many short sentences back to back.

The Kw766XTR is a low-profile desktop scanner. It has outstanding performance. It offers a frequency range of 29–54 and 108–174 MHz. It includes 50 memory channels. The design is sleek. Individual channels can be locked out. They can also be delayed.

Jargon

When you need to use technical terms (jargon), make sure your audience knows what you are talking about.

If your audience doesn't understand your jargon, your writing or speech will risk being perceived as technobabble or gobbledegook!

When you introduce a new word or acronym define it.

We developed a neural network that predicts whether the image contains a nice person or a person that is not nice.

A neural network is...

To measure algorithm success, we use RMSE (Root Mean Squared Error, defined in equation 2) between predicted robot location and actual robot location.

When you introduce a new word or acronym define it.

Then it goes into the ROM (Read-Only Memory).

To understand our billing process, you first need to know what a British Thermal Unit (BTU) is.

If an abbreviation is too complicated, you may remind your reader more than once what it stands for, or provide a glossary they can refer to.

Initialisms vs Acronyms

Initialisms

UHF

IBM

LED

GPA

LEM
(Lunar excursion module)

FORTRAN

Acronyms

AIDS

RAM

ROM

NATO

NASA

Initialisms vs Acronyms

Use the correct form of *a/an* before an initialism. No matter what the first letter is, if it is pronounced with an initial vowel sound (for example, the letter M is pronounced “em”), write *an* before it:

an MTCR (Missile Technology Control Regime)

an LED readout

an SRU pin

an ultrasonic frequency (but a UHF receiver)

Some abbreviations might fool you. Consider LEM (lunar excursion module) for example. If the custom is to pronounce it as an initialism, L-E-M, then you will have *an LEM*. If it is normally considered an acronym (as one word), you will have *a LEM*.

Initialisms and Acronyms

Form the plural of acronyms and initializations by adding a lowercase *s*. Only put an apostrophe between the abbreviation and the *s* if you are indicating a possessive form:

We ordered three CRTs.

We weren't satisfied with the last CD-ROM's performance.

or

We weren't satisfied with the performance on the last CD-ROM.

Numbers

Numbers are expressed as words (twelve) or numerals (12). Cardinal numbers are *one*, *two*, *three*, etc. Ordinal numbers are *first*, *second*, *third*, etc. Although custom varies, it's a good idea to write the cardinal numbers from one to ten as words and all other numbers as figures.

two transistors *232 stainless steel bolts*
three linear actuators *12 capacitors*

However, when more than one number appears in a sentence, write them all the same:

The IPET has 4000 members and 134 chapters in 6 regions.

Also, use numerals rather than words when citing time, money, or measurements:

1 A.M. \$5.48 12.4 m 8 ft

Numbers

Spell out ordinal numbers only if they are single words. Write the rest as numerals plus the last two letters of the ordinal:

*second harmonic 21st element
fourteenth attempt 73rd cycle*

If a number begins a sentence, it's a good idea to spell it out regardless of any other rule.

Thirty-two computers were manufactured today.

To avoid writing out a large number at the beginning of a sentence, rewrite the sentence so it doesn't begin with a number:

Last year, 5198 engines were manufactured in this division.

or

This division manufactured 5198 engines last year.

Numbers

Form the plural of a numeral by adding an *s*, with no apostrophe:

80s *1920s*

Make a written number plural by adding *s*, *es*, or by dropping the *y* and adding *ies*:

nines *sixes*

fours *nineties*

Place a zero before the decimal point for numbers less than one. Omit all trailing zeros unless they are needed to indicate precision.

0.345 cm *12.00 ft*

0.5 A *19.40 tons*

Write fractions as numerals when they are joined by a whole number. Connect the whole number and the fraction by a hyphen:

2-1/2 liters *32-2/3 km*

Units

Units of measurement derived from a person's name usually are not capitalized, even if the abbreviation for the unit is. Note also that although the name can take a plural form, an *s* is not added to the abbreviation to make it plural:

amperes A

farads F

henrys H

kelvins K

teslas T

volts V

webers Wb

Explain the units
when needed

$$P = IE \quad (1)$$

where

P = power, measured in watts

I = current in amperes

E = EMF (electromotive force) in volts

Equations

$$F(x) = \int \log x \, dx \quad (1)$$

$$H(s)(xv_2) = X(s)/Y(s) \quad (2)$$

Equations

The total harmonic distortion (THD) of voltage at any bus k is defined as

$$THD_k = \frac{\sqrt{\sum_{h=2}^H |V_k^h|^2}}{|V_k^l|}, \quad (3)$$

THD can be incorporated into the minimization procedure in [2] by considering a network function that equals the sum of squared THD _{k} s, or

$$\begin{aligned} f(I_m) &= \sum_{k=1}^K (THD_k)^2 = \sum_{k=1}^K \left[\frac{\sqrt{\sum_{h=2}^H |V_k^h|^2}}{|V_k^l|} \right]^2 \\ &= \sum_{h=2}^H \sum_{k=1}^K \frac{1}{|V_k^l|^2} |V_k^h|^2. \end{aligned} \quad (4)$$

Note that (4) is identical to (2) when $y(h) = 1$ for $h = 2, 3, 4, \dots, H$, and when

$$b(k) = \frac{1}{|V_K^l|^2}, \quad k = 1, 2, 3, \dots, K. \quad (5)$$

Since the fundamental frequency voltages are approximately 1.0 pu, the objective function of (4) is a close approximation to that of (1).

Don't be afraid to typeset your own equations

- MS Word, LibreOffice etc. have good equation editors:

$$\sum_k \int_i \sqrt{\frac{2\pi}{\sigma_k}} e^{\frac{(i-\mu)^2}{\sigma_k^2}}$$

Equation Numbering: (1)

- Latex is the gold standard in equation editing.

$$\sum_k \int_i \sqrt{\frac{2\pi}{\sigma_k}} e^{\frac{(i-\mu)^2}{\sigma_k^2}}$$

Equation Numbering: (1)

Define all terms you introduce in and out of equations.

$$D(y, y') = \sum_p (y_p - y'_p) \quad p \in P \quad (2)$$

In equation 2, y is the actual image, y' is the predicted image, P is the set of pixel locations in the image, and y_p and y'_p are the actual and predicted image values at location p .

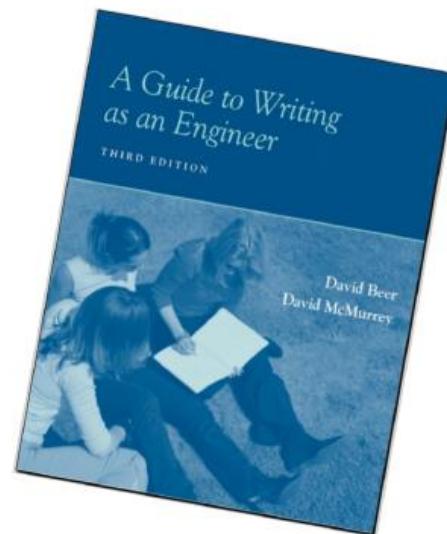
EDIT, EDIT, EDIT

- Make time to edit your work carefully.
- Take the trouble to edit your work carefully.
- Do not send a first draft of anything of importance to your readers.
- Examine your work with an editorial eye before sending it out.
- Have another person you trust proofread your work.

More information: **Chapter 2** of the textbook.

David Beer, David McMurrey (2009).
A Guide to Writing as an Engineer.
3rd or 4th Ed. Wiley: New Jersey, USA.

Also In library.



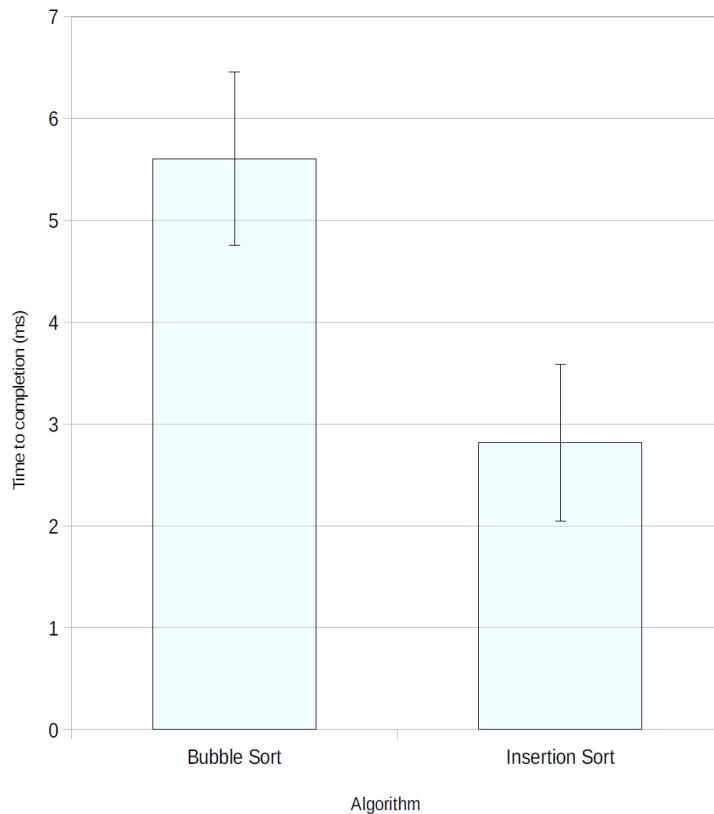
Examples of Term Project Topics

- Comparing sorting algorithms
- Usability testing

Analytical Tools: aggregate comparison

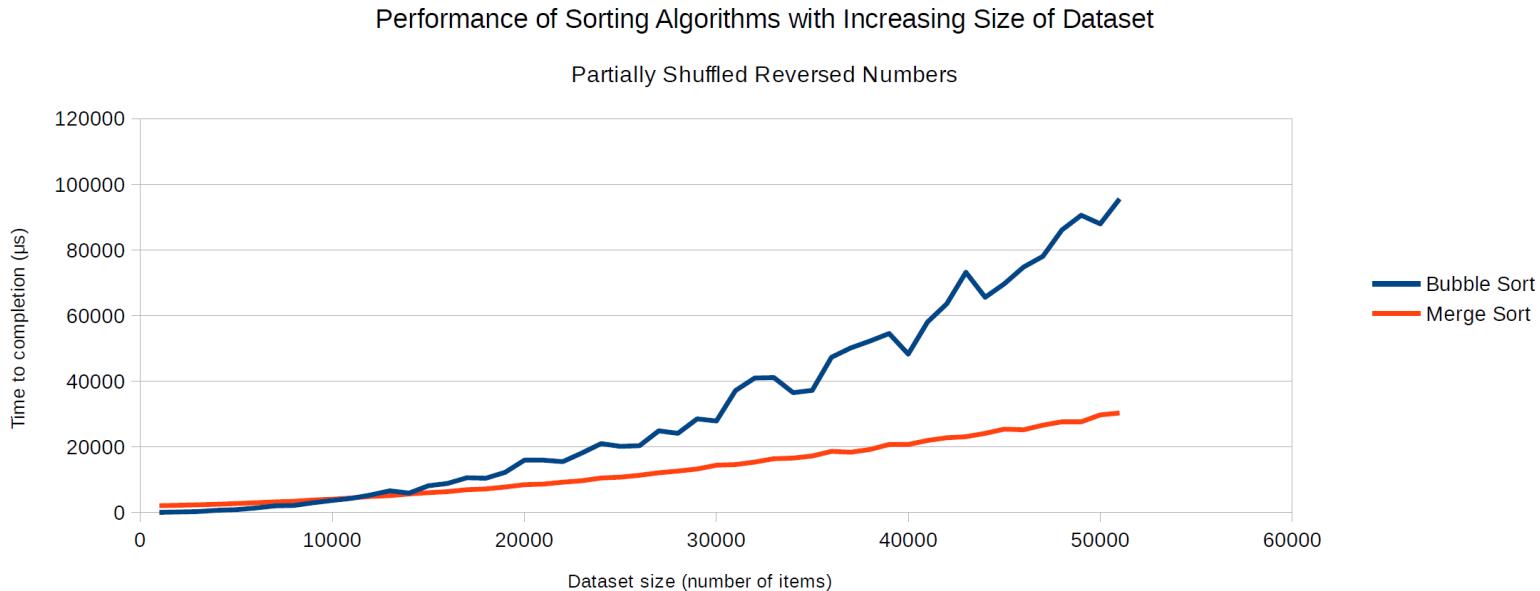


Time to completion of sorting algorithm on partially shuffled reversed text list



- N runs.
- 2 algorithms.
- Same data.
- Multiple data-sets. City tel. codes; sets of random integers.
- Measure completion time.

Analytical Tools: Trend



- Change input parameters: multiple data sets.
- 2 algorithms.
- Measure completion time.

Examples of Term Project Topics

- Comparing sorting algorithms
- Usability testing

What is usability testing?

Systematic investigation of how a software product is used for the purpose of improving it.

Involves:

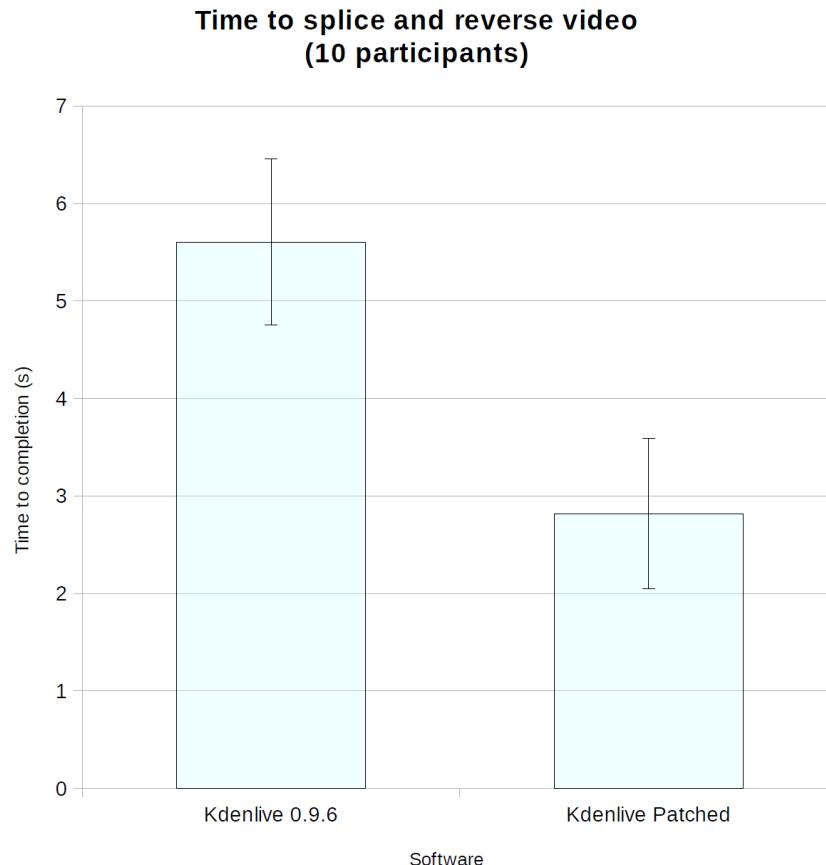
- Careful observation.
- Experimentation.

What is usability testing?

e.g.:

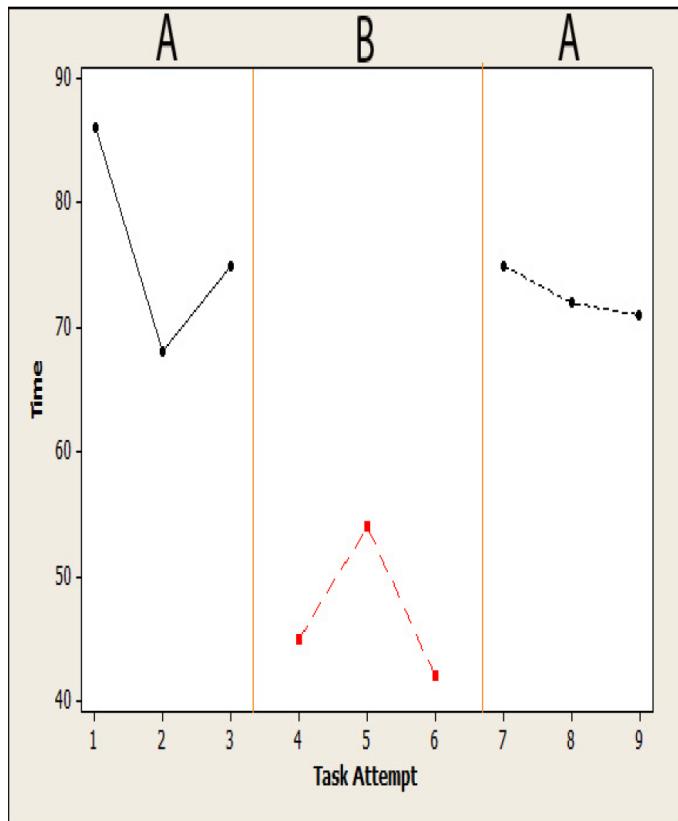
- Kdenlive vs Cinelarra:
 - Cutting and combining two clips.
- Kdenlive:
 - Tutorial-based vs. help-based learning.

Types of usability studies: Random assignment experiment



- N participants.
- 2 variations.
- Randomly assign participants to variation.
- Measure how long or how many errors.

Types of usability studies: ABA study



- 2 different variations (A & B).
- Users do task:
1. With **A** 3 times.
 2. With **B** 3 times.
 3. With **A** 3 times.
- As few as 1 user.

Observational Analysis

"I couldn't find
how to cut off
the clip"

"I had to be
very careful
to click the
border"

- Watch someone using software.
- Keep notes.
 - Use a timer, keep a timeline.
- Ask questions after.
- Mostly qualitative.

