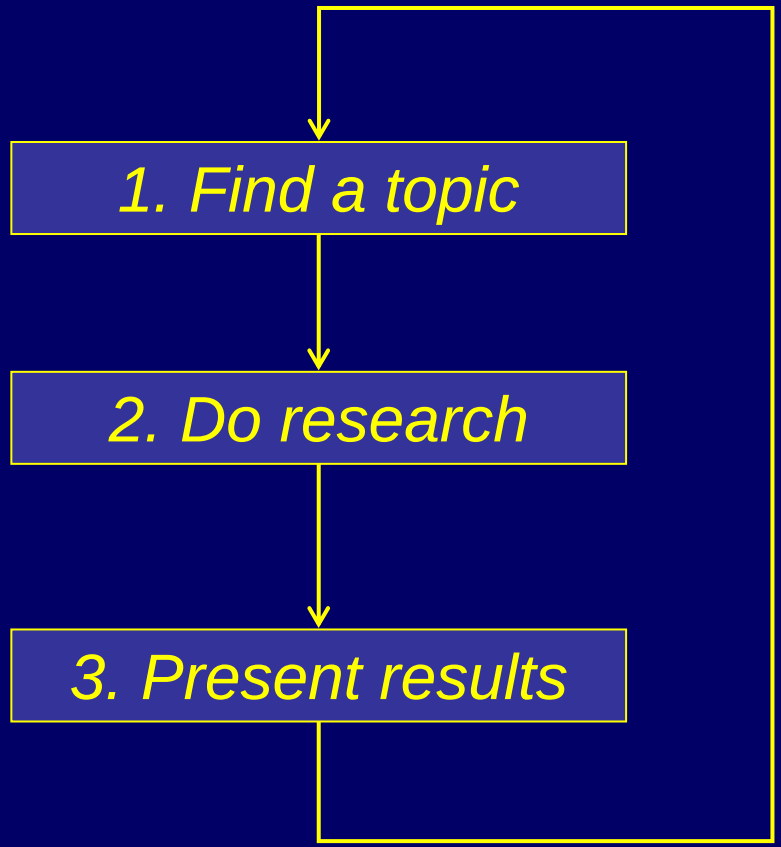
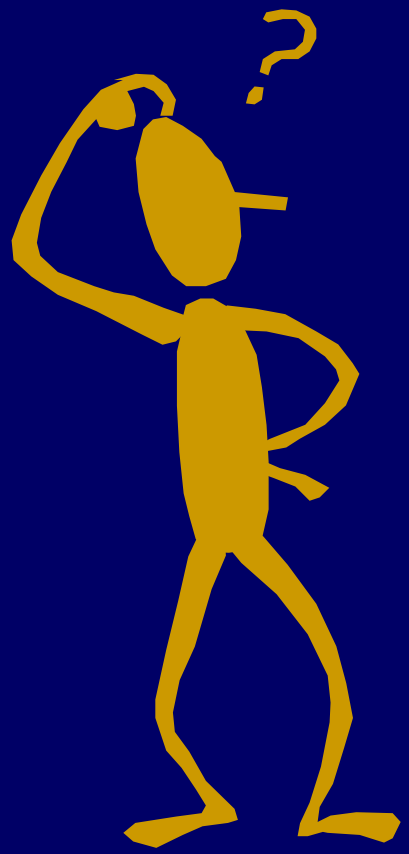
# Research in Information Technology

**Peter Eades**


1. Find a topic
2. Do research
3. Present results

# 1. Find a good topic



## Two more extreme topics

Narrow Nancy

***The effect of the use of critical path planning in managing software projects***

*Narrow and deep: An investigation of a few variable parameters, with many parameters held fixed.*

***How to manage software projects***

Broad Betty

*Wide and shallow: Considers many parameters at once.*

# Find a good topic

## Narrow and broad

### Narrow Nancy

*Assume*

- *an OO design method*
- *Java*
- *small teams*
- *10K – 100K SLOC*

*Investigate effect of*

- *use of critical path planning*

### Broad Betty

*Investigate the effects of*

- *15 different design methodologies*
- *7 different programming languages*
- *Small – huge SLOC*
- *17 different planning methods*

# Find a good topic

| ***Narrow and deep topic*** |
| --- |
| Advantages<br>• More chance of pushing the boundary of knowledge<br>• More exciting |
| Disadvantages<br>• Your “model” may be too abstract and unrealistic<br>• It’s hard to choose the variable parameters |

| ***Wide and shallow topic*** |
| --- |
| Advantages<br>• Realistic<br>• Good training for industrial research |
| Disadvantages<br>• Mostly boring, like a collection of honours theses<br>• Unlikely to contribute a lot |

# Find a good topic

Another two extreme topics

***Robustness theorems for non-pre-emptive scheduling methods***

Fred the fundamentalist

*Fundamental topic: abstraction of specific hardware and software*

***Disk cache scheduling for Gnu C++ memory management on a Pentium 4 processor running Solaris***

Andy the applicationist

*Applied topic: specific hardware, specific software*

# Find a good topic

| ***Fundamental topic*** | ***Applied topic*** |
| --- | --- |
| Advantages<br>• Your thesis will have a longer life<br>• Your work can have more applications | Advantages<br>• Easier problems<br>• May help with getting a job in industry<br>• Can contribute a lot to a relevant area |
| Disadvantages<br>• It's hard to push the boundaries very far<br>• Your "model" may be too abstract and unrealistic | Disadvantages<br>• Your thesis can die young<br>• Your employment prospects can be shortlived<br>• Restricted applications |

# Find a good topic

Another two extreme topics

***P=NP***

Classical Kirsty

*I want to solve an problem that has defeated many others*

Popstar Paul

***Web-enabled distributed data mining for facebook social networks with 3D graphics***

*I want a lot of newspaper coverage*

# Find a good topic

## *Classical topic*

Advantages

- You may win the lottery and solve a hard problem
- Your thesis may have a long life
- Better referees
- Higher scientific quality

Disadvantages

- Can be frustrating
- Immediate rewards can be small

## *Hot topic*

Advantages

- Better immediate feedback
- With good timing, you can get rich
- Easier to publish
- Easier problems
- Vibrant community

Disadvantages

- Your thesis can die young
- Scientific quality can be low

# Find a good topic

An[illegible] two extreme [illegible]

[illegible]

***My advice***

Investigate a ***fundamental*** and ***classical*** topic, with some applications to a couple of ***hot*** and ***applied*** topics.

[illegible]e,

[illegible]te[illegible]o be

[illegible]he h[illegible]

# Find a good topic

***General advice on topics***

Investigate a ***classical***, ***fundamental***, ***deep***, and ***narrow*** topic, with some (perhaps shallow) applications to a couple of ***hot applied*** topics.

Obtain ***breadth*** by being a ***member of a team*** or ***research community***

Also .. .. … …

## Find a good topic

Two extreme topics

Irene the introvert

***$2^{231}$-1 is a prime number***

*This problem has been bothering me for decades. I can't rest until I know the answer.*

Eddie the extravert

***$2^{231}$-1 is a prime number***

*A guy in a software security company has been phoning my supervisor to ask about this "possibly prime" number,* ***$2^{231}$-1.***

I'll try to solve the problem.

# Find a good topic

Two extreme topics

***Irene the introvert:*** self-motivated, wants to find out for her own sake.

***Eddie the extravert:*** Has a customer who wants to know, he will try to find out

There is no customer

Customer oriented

The customer may be an industrial partner, or a separate community of academic researchers

# Find a good topic

| *Introverted research* | *Customer-oriented research* |
| --- | --- |
| Advantages<br>• More exciting for some people | Advantages<br>• Good chance of good feedback<br>• Good chance of funding<br>• Better scientific criticism<br>• Better grounded in reality |
| Disadvantages<br>• Funding unlikely<br>• May be worthless to everyone except yourself | Disadvantages |

**Find a good topic**

***Int***

***My advice***

Ensure that you have

***a customer***

***oriented***

- *The customer is possibly but not necessarily an industrial customer*
- *The customer may be another research group*
- *The customer should be outside your own research community*
- *The customer should be interested in results, not in methods*

Think of your topic in terms of your thesis . . . .. .. .. ... ... ...

## Find a good topic

Thesis structure:

- Fundamental principles
- Case studies, some in the context of your customers
- Refer to case studies of other team members

***PhD Thesis***

*. . .*

*Chapter 2*

Investigation of a very difficult well known classical fundamental problem

. . .

. . .

Chapter 5: Case study 1, some hot topic

Chapter 6: Case study 2, applied topic in customer context

. . .

Chapter 9 *Conclusions*: Refer to case studies by your colleagues

## Find a good topic

Classical fundamental problem

Applications to hot and very applied topics

***A model of optimizing compilers***

. . .

Chapter 2 Describe a new model for optimal code

Chapter 3 Algorithms for creating optimal code under this model

. . . .

Chapter 5: Case study 1: how this model applies to mobile agents

Chapter 6: Case study 2: comparison of optimal/sub-optimal code in a distributed transaction system

. . .

Chapter 9 Conclusions: further support for your hypotheses from work of your colleagues

# 2. Do Research

## Do Research

*The research procedure*

1. The customer has a problem.
2. The researcher produces an initial model of the problem.
3. ***Repeat***
   a) The researcher solves the problem, according to the model.
   b) The researcher evaluates the solution of the model problem.
   c) The customer evaluates the solution to the real problem.
   d) The researcher adjusts the the model.

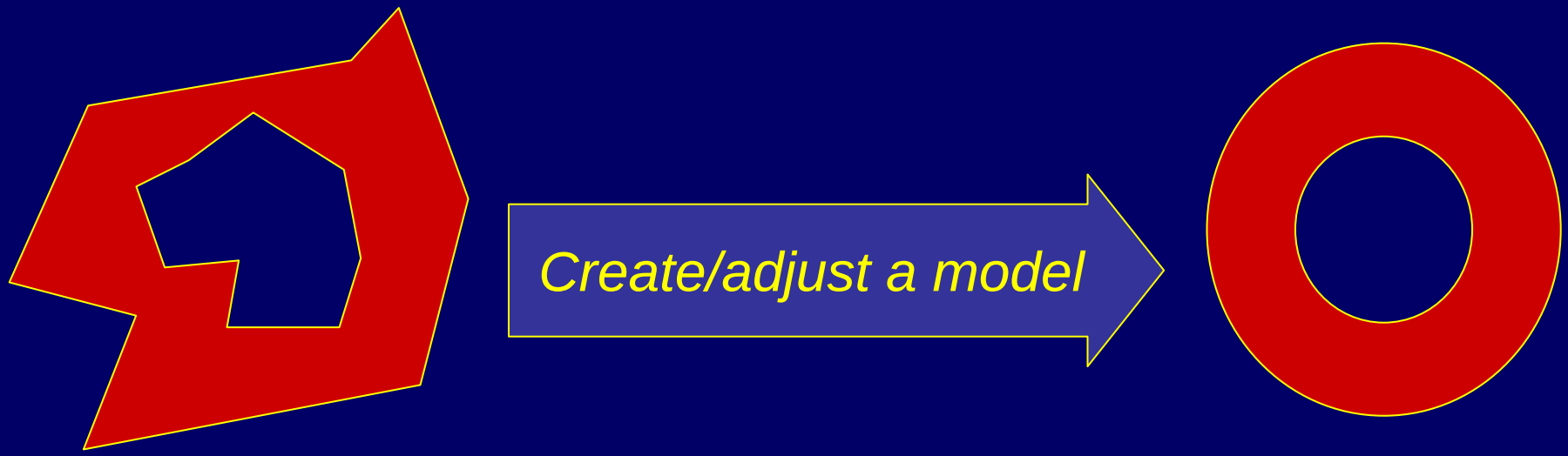
   ***Until*** the customer is satisfied.

## Do Research

***Researchers have several roles to play***

1. *Create* and *adjust* *models* of problems
   - ✓ abstract away non-essential details
   - ✓ use scientific theories and formalisms
2. *Solve* model problems
   - ✓ Use skills in CS/Math/sociology/psych/commonsense ..
   - ✓ Form hypotheses and solutions
3. *Evaluate* hypotheses and solutions to the model problems
   - ✓ Use skills in Math/Experiments/UCST

# Create a model



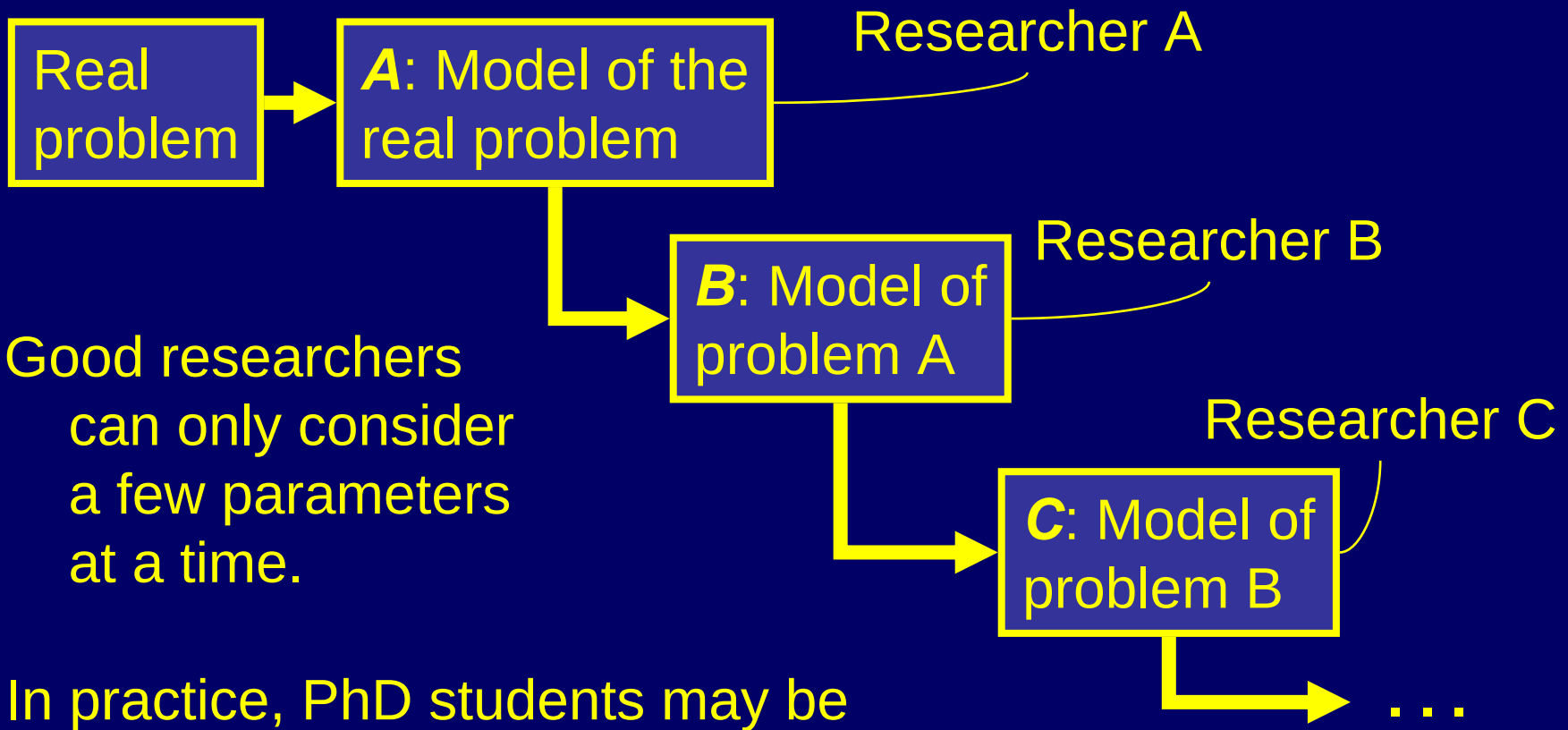

## ***1. Creating/adjusting a model***

A model is formed by *forgetting* some of the parameters of the real problem; models are simplifications of real problems.

In IT, models are usually *formal* and *mathematical*.

## Create a model

In practice, many models are models of models.




Good researchers
can only consider
a few parameters
at a time.

In practice, PhD students may be
involved at level B or C or even D
…

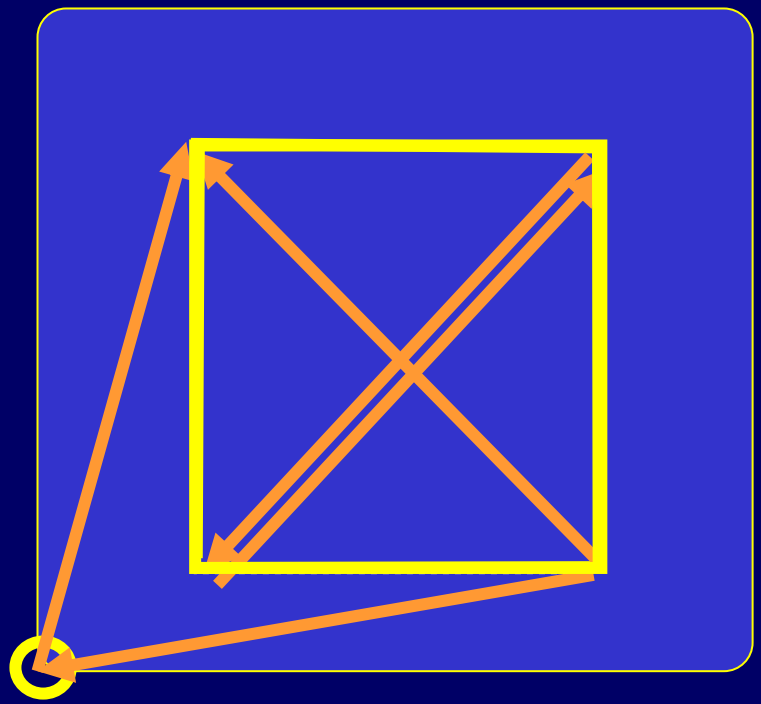
***Example: the plotter problem***

A pen plotter is a calligraphic device: it has a pen which moves over the paper to draw the picture.

# Plotter Optimisation

***The plotter problem***

- A pen plotter has a pen which can be *up* or *down*.
- It accepts a sequence of *penUp/Down/moveTo* instructions.



*penUp; moveTo (20,80)*
*penDown; moveTo (80,80)*
*penUp; moveTo (20,20)*
*penDown; moveTo (80,20)*
*penUp; moveTo (20,20)*
*penDown; moveTo (80,20)*
*penUp; moveTo (20,80)*
*penDown; moveTo (20,20)*
*penUp; moveTo (80,80)*
*penDown; moveTo (80,20)*
*penUp; zero*

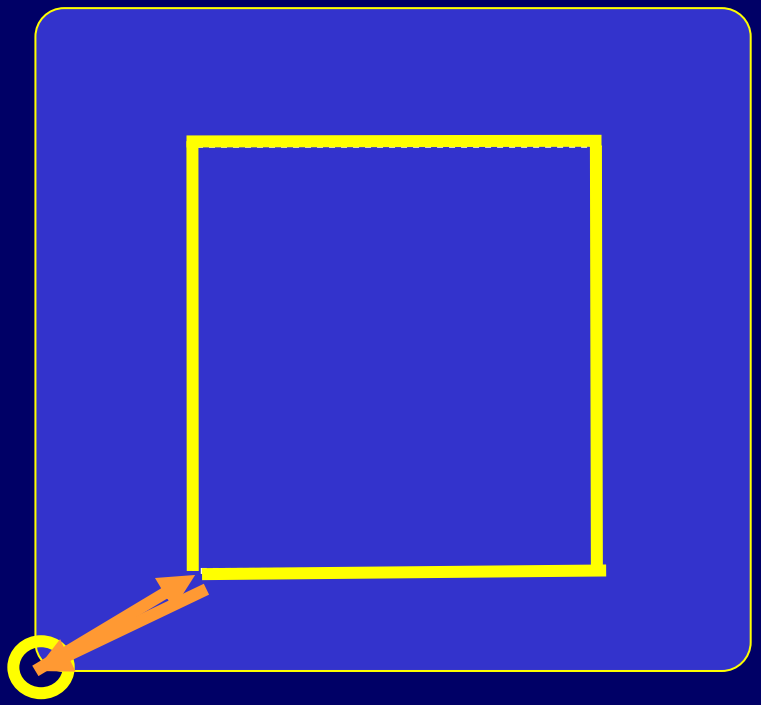
# Plotter Optimisation

The order of the instructions has an effect on the pen-up time.

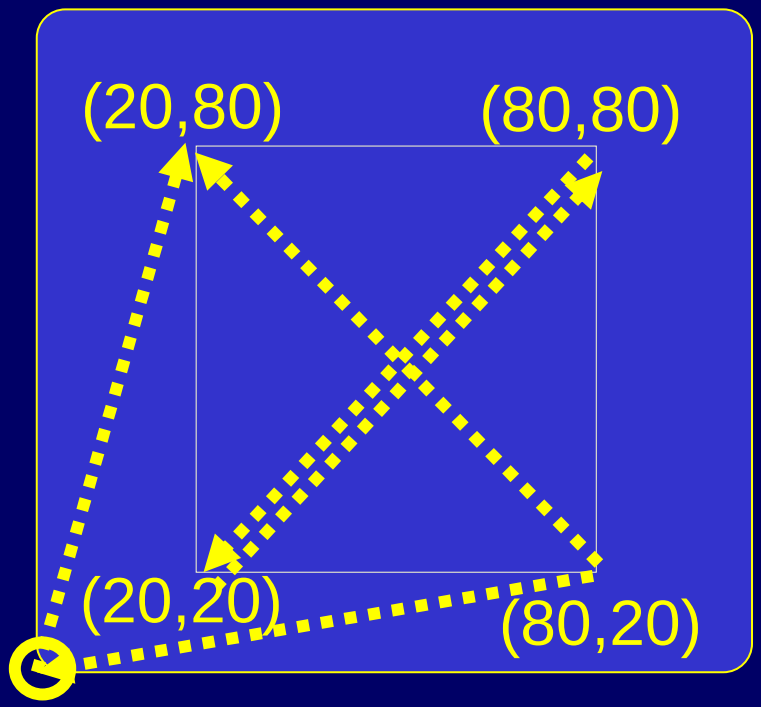
***The plotter problem***:

*Sort the instructions into an order that minimizes pen-up time.*

*penUp; moveTo (20,20)*
*penDown; moveTo (20,80)*
*moveTo (80,80)*
*moveTo (80,20)*
*moveTo (20,20)*
*penUp; zero*



# Plotter Optimisation




Say speed = 5cm/sec

Bad solution:

Pen-up time = 71 seconds.

Good solution:

Pen-up time = 6 seconds

***The model***

*We have:*

- A set of "*primitives*"
- Each primitive has a *start point* and a *finish point*.
- The *pen-up time* is the sum of the distances from the finish point of one primitive to the start point of the next primitive.

*We want:*

- An ordering for the primitives to minimize *pen-up* time.

The model *forgets* some parameters:

- The encoding system for the instructions
- The size of the paper
- The colours

***2. Finding a solution***

Solutions are artifacts that help the customer.

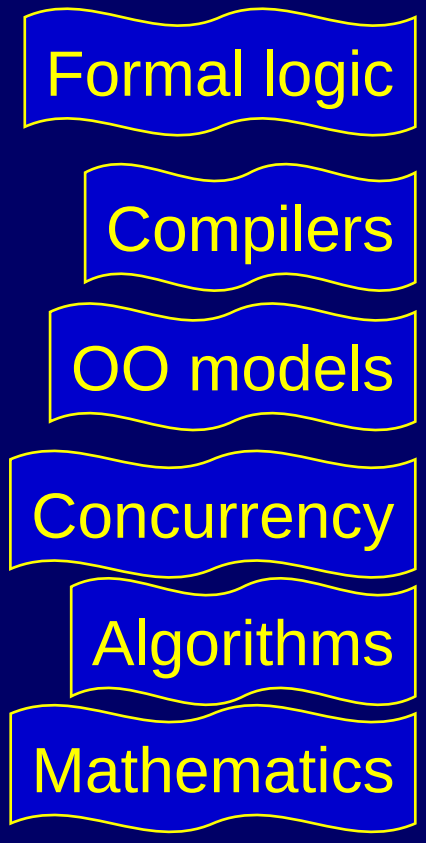
*Artifacts that make up a solution*

- Programs
- Metaphors
- Protocols
- Architectures
- Algorithms

. . . .

## Solving the problem

*Skills that contribute to a solution*




A solution is found using the skills of the researcher.

Your skill set is probably not enough to create a solution.

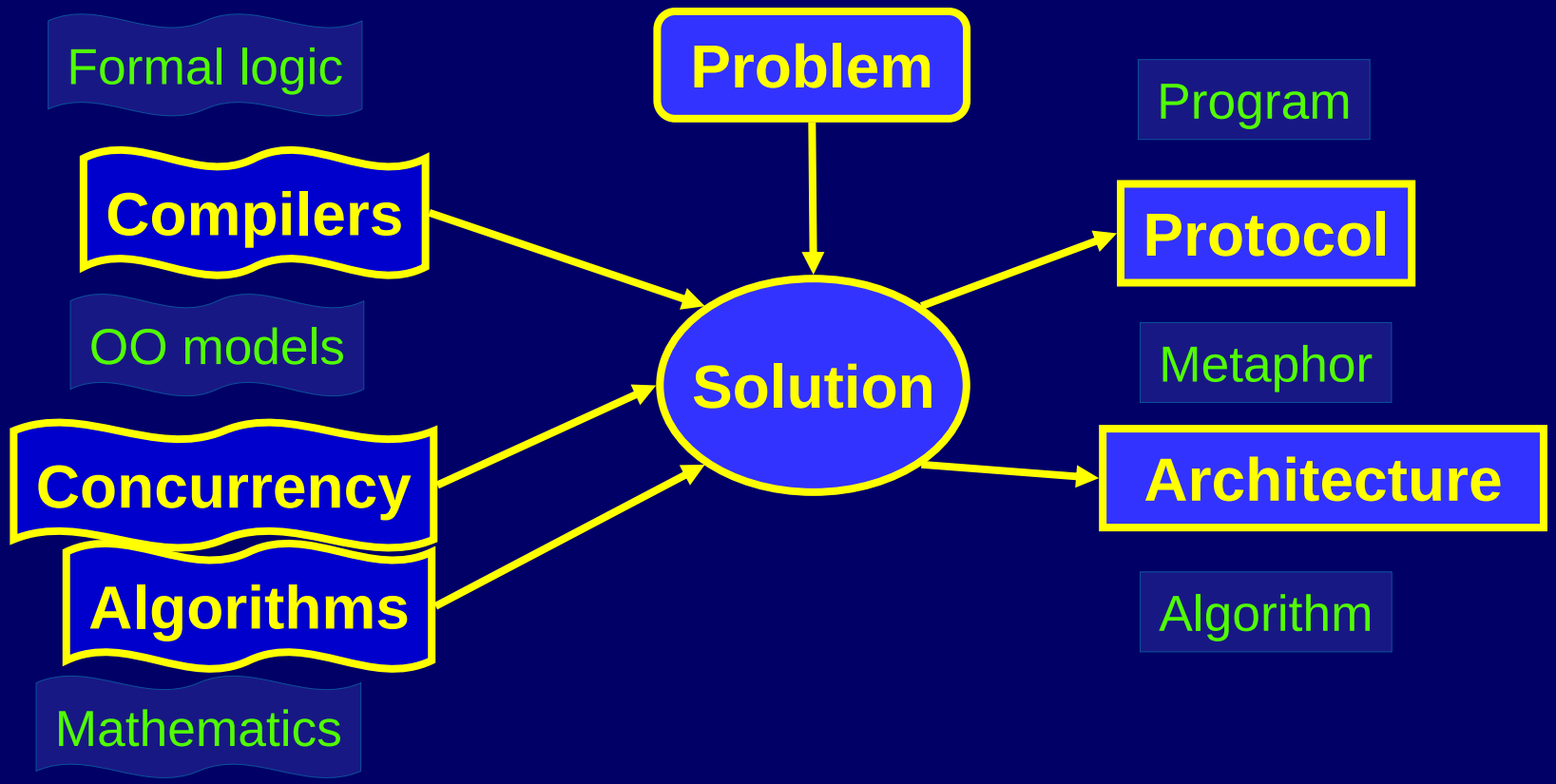
You probably need to increment your skill set

- Remember your undergraduate work
- Read books and research papers
- Attend seminars and conferences
- Ask your supervisor

Better research comes from a better skill set.

# Solving the problem

Researchers draw on a number of fundamental skills to create a solution consisting of a number of artifacts.



# Plotter Optimisation

***Back to the plotter***

***Solution***

One easy solution is the greedy algorithm:

1. *Choose the first primitive so that its start point is the closest start point to PEN_ZERO.*
2. ***Repeat*** *for k=1 to NUM_PRIMS-1*

   *Choose $k^{th}$ so that its start point is the closest unused start point to the previous finish point.*

# Plotter Optimisation

For example:

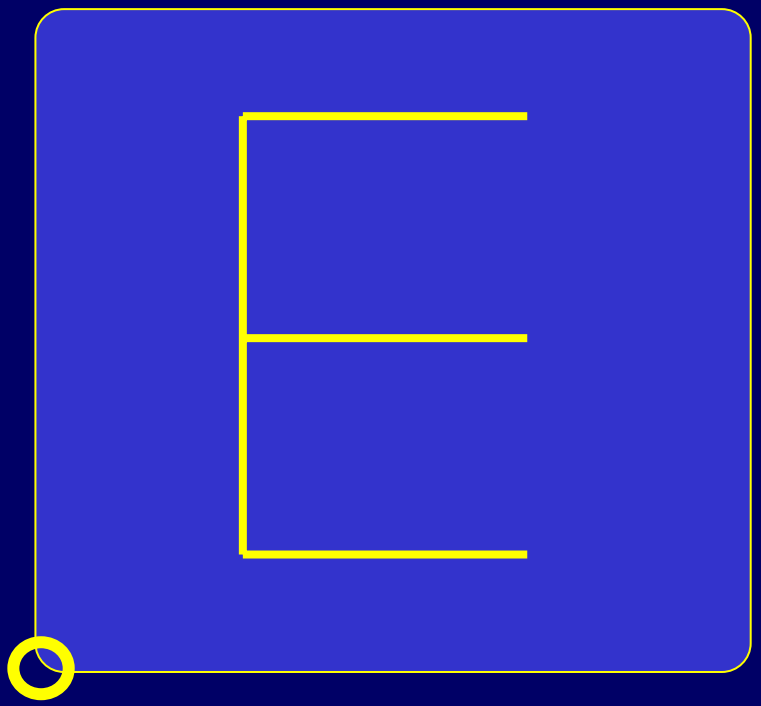
- Draw an upper case “E”

Primitives:

- Line from (0.3, 0.2) to (0.3, 0.8)
- Line from (0.3, 0.2) to (0.7, 0.2)
- Line from (0.3, 0.5) to (0.7, 0.5)
- Line from (0.3, 0.8) to (0.7, 0.8)

The problem:

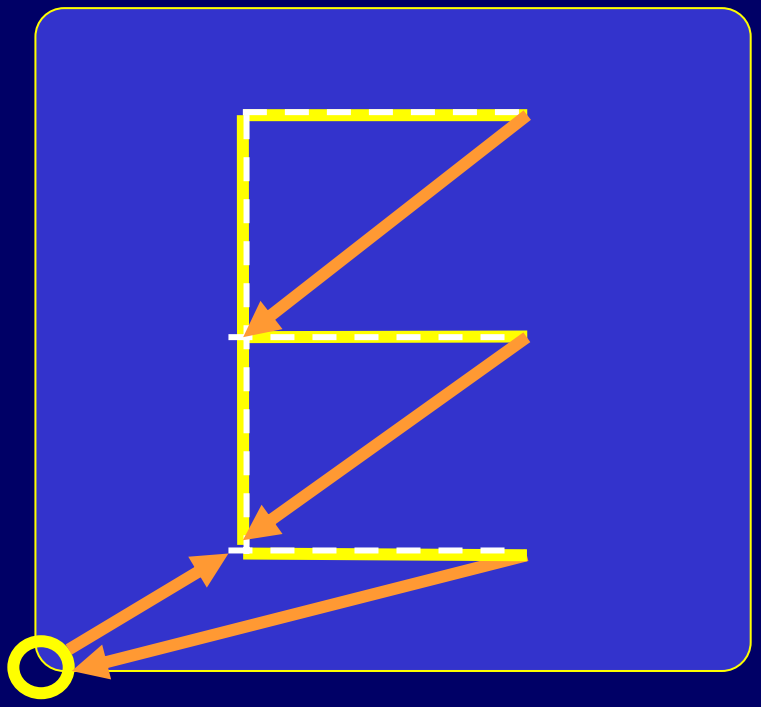
- Order these greedily . . . …



# Plotter Optimisation

Greedy path:

1. **Start at (0.0,0.0)**
2. **PenUp; move to (0.3, 0.2)**
3. PenDown; move to (0.3, 0.8)
4. PenDown; move to (0.7, 0.8)
5. **PenUp; move to (0.3,0.5)**
6. PenDown; move to (0.7, 0.5)
7. **PenUp; move to (0.3, 0.2)**
8. PenDown; move to (0.7, 0.2)
9. **PenUp; move to (0.0,0.0)**



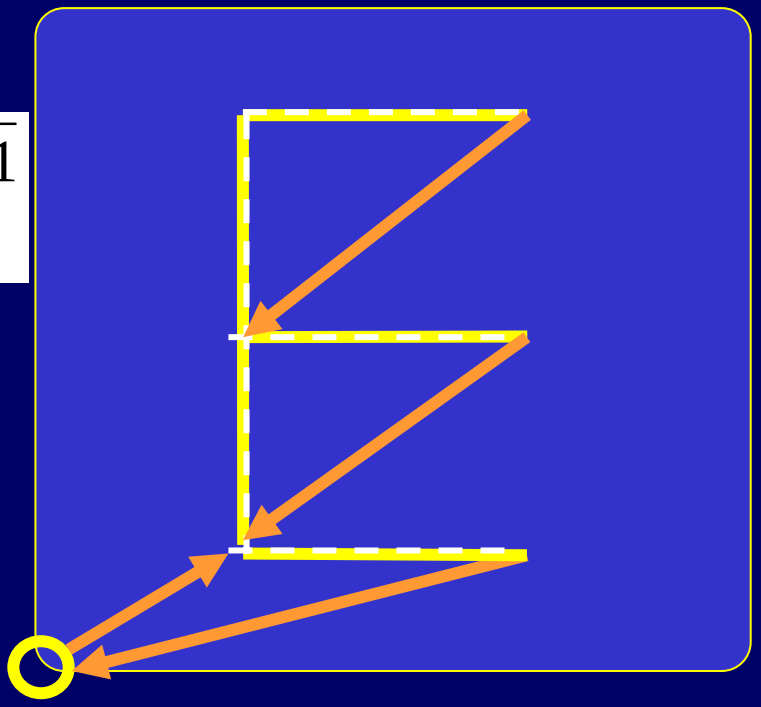
## Plotter Optimisation

If PenUp moves are $(xstart_i, ystart_i)$ to $(xfinish_i, yfinish_i)$ then we can calculate the total PenUp time by adding up the Euclidean distances:

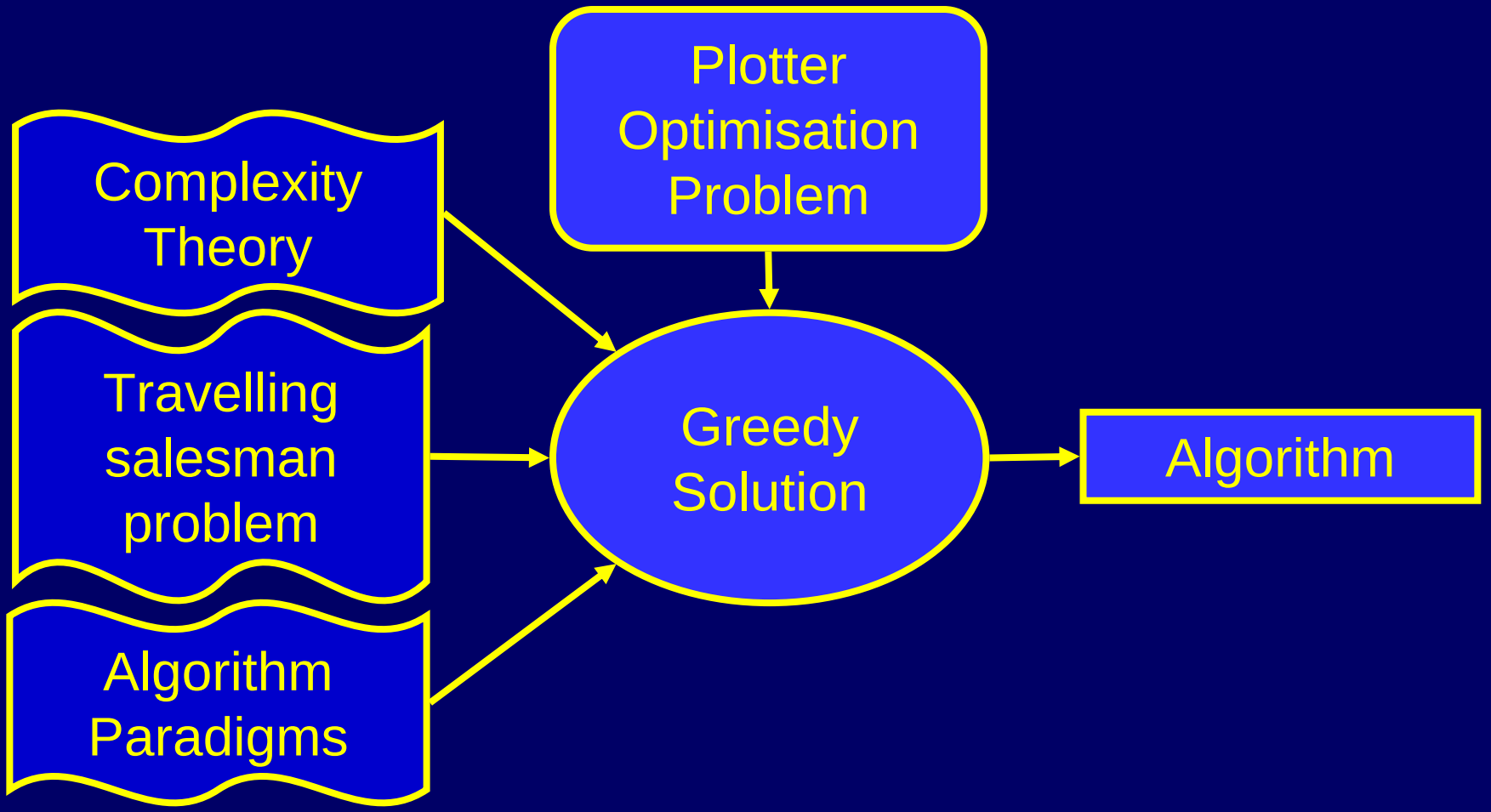
$$PenUp = \sum_i \sqrt{(xstart_i - xfinish_i)^2 + (ystart_i - yfinish_i)^2}$$

In this case

$$PenUp = \sqrt{0.13} + \sqrt{0.25} + \sqrt{0.25} + \sqrt{0.51}$$
$$= 2.074$$



# Plotter Optimisation



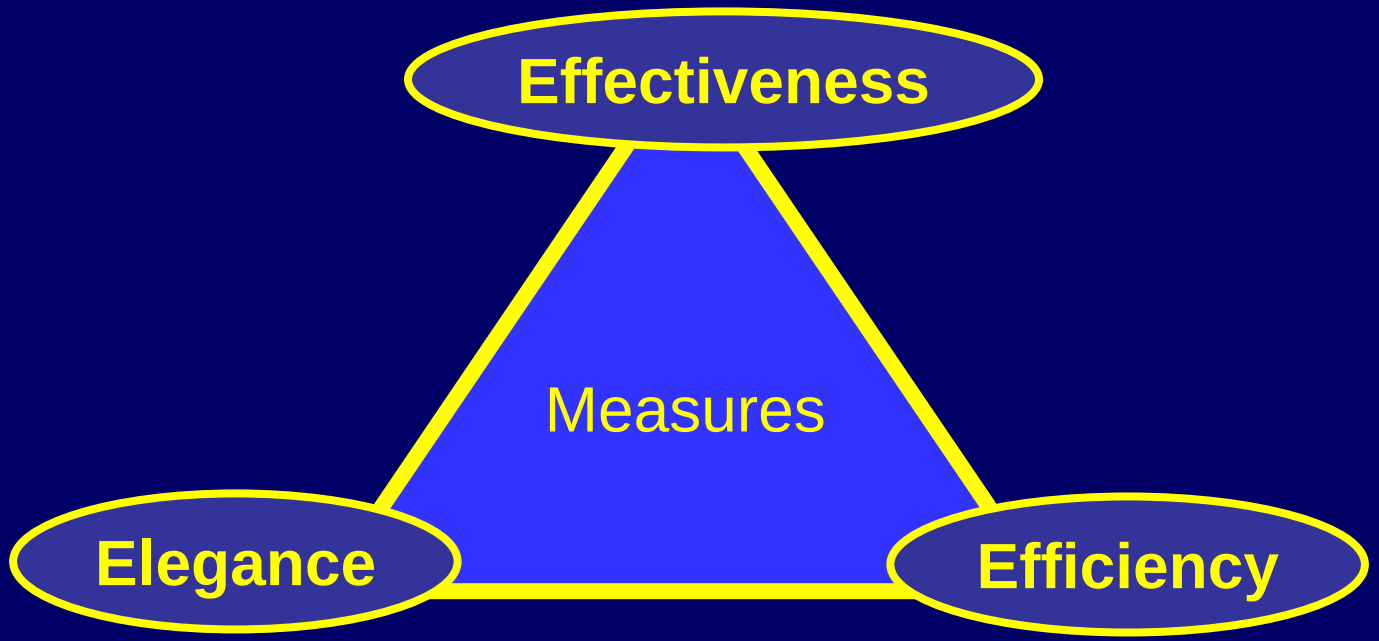
***3. Evaluating a solution***

To evaluate a solution, you need

- An evaluation ***measure*** that tells you whether the solution is good or bad
- An evaluation ***method*** to compute the measure

***Evaluation measures***

There are three basic *measures* for the quality of a solution:



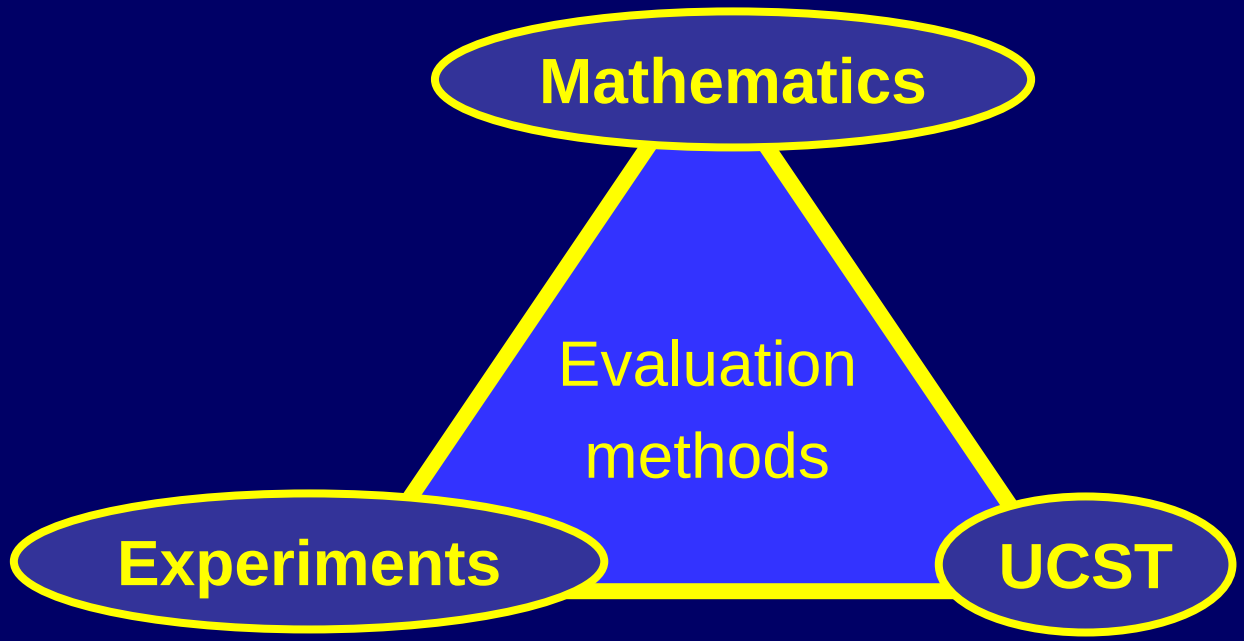
## Evaluation

The $E^3$ measures:

1. ***Effectiveness***: is the solution logically correct? Is it optimal? Is it satisfactory for the customer?
2. ***Efficiency***: does the solution use computational resources efficiently?
3. ***Elegance***: is the solution beautiful, simple, and elegant?

*My conjecture: All solutions can be measured in terms of these three parameters.*

There are three basic ***evaluation methods***




And many combinations of these approaches

## Evaluation

The three methods:

1. ***Mathematics***
   - You prove a theorem that says that the solution is effective/elegant/efficient
2. ***Experiments***
   - Run programs on test data
   - Test systems with human subjects
3. ***UCST***: Try to sell your solution

*My conjecture: These are the only evaluation methods in information technology.*

***Evaluation of the greedy plotter optimisation by UCST***

1. The greedy solution can be "proven" ***effective*** by UCST.

   ***UCS Assertion***:

   "Since it chooses the best alternative at each stage, it gives minimum pen up time".

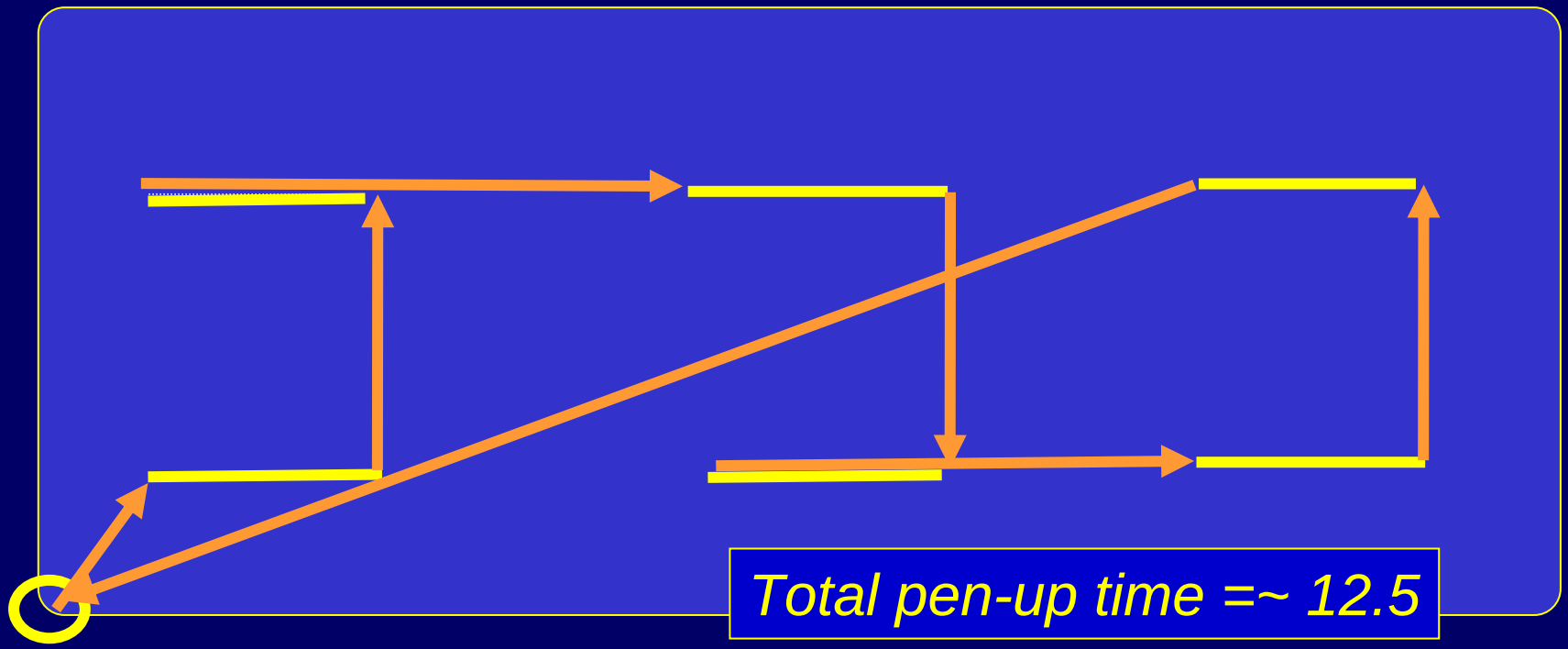
   This may be convincing for some customers, but not for PhD thesis examiners.

2. The greedy solution is ***elegant*** by UCST: it is easy to understand, easy to implement.

***Mathematical Evaluation***

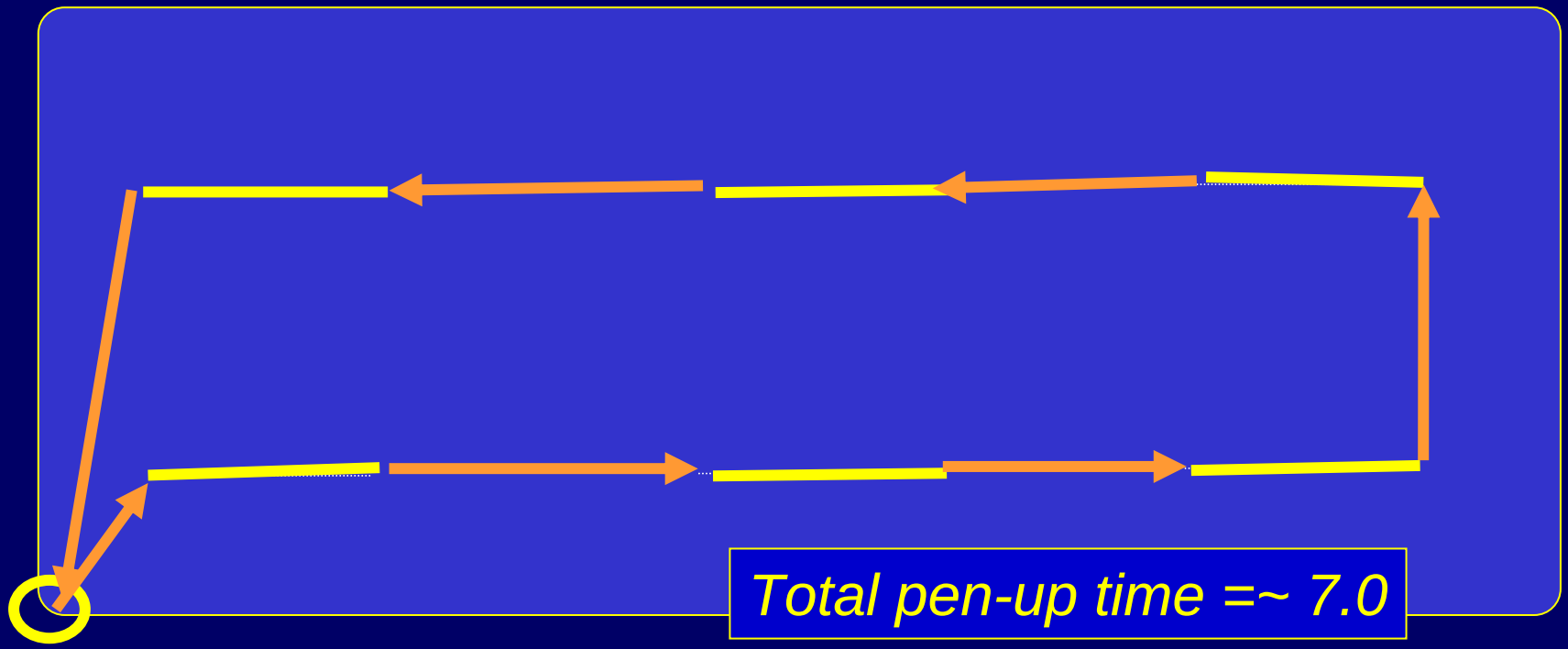
The greedy solution can be investigated for ***effectiveness*** using Mathematics.

a) Negative result: Greedy does not always give optimal results.



# Plotter Optimisation

The optimal path is shorter.



***Mathematical evaluation***

b) The greedy method is *close* to optimal:

***Theorem***

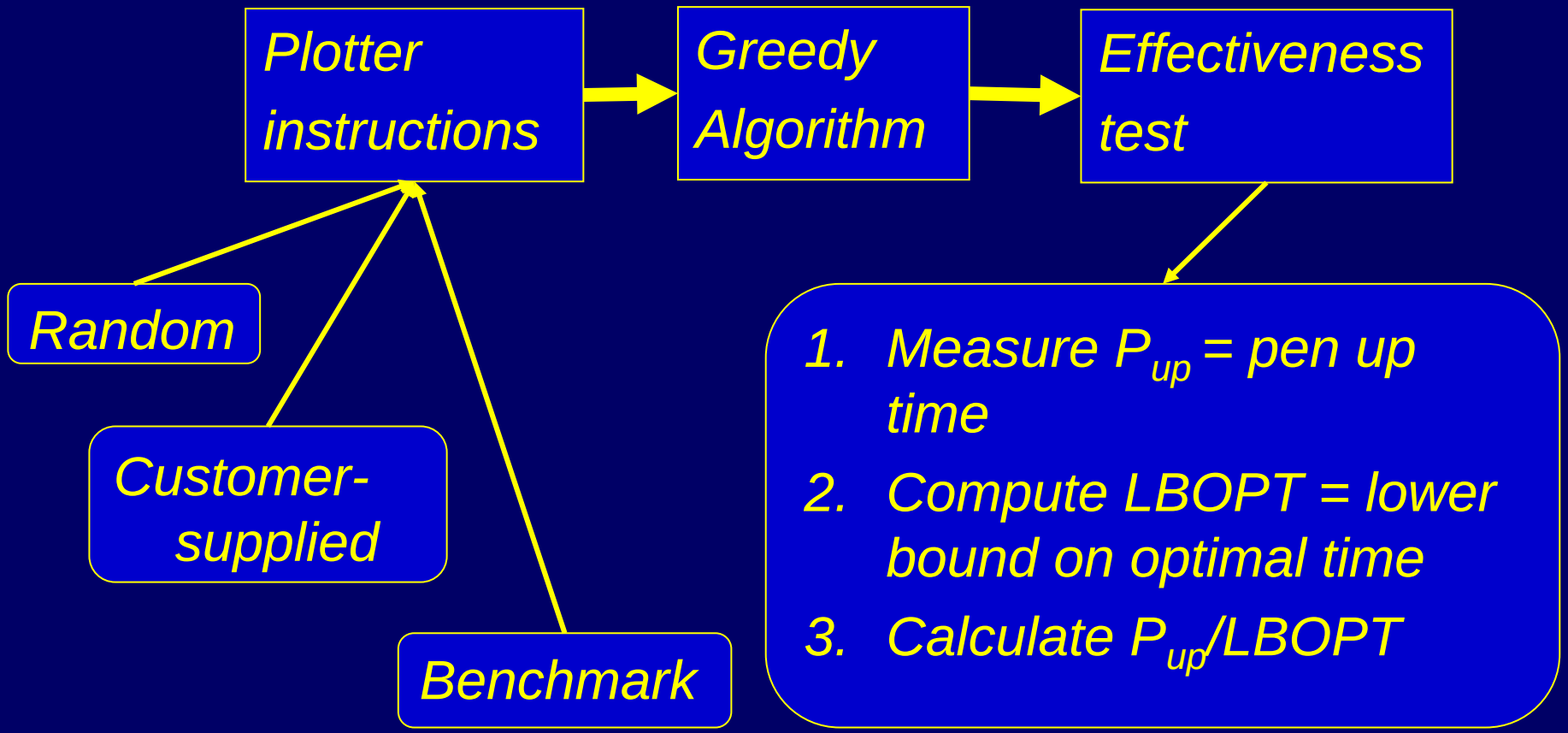
*If* ***GREED*** *is the pen-up time with the greedy solution and* ***OPT*** *is the pen-up time with the optimum solution then*

$$GREED / OPT = O(\log n).$$

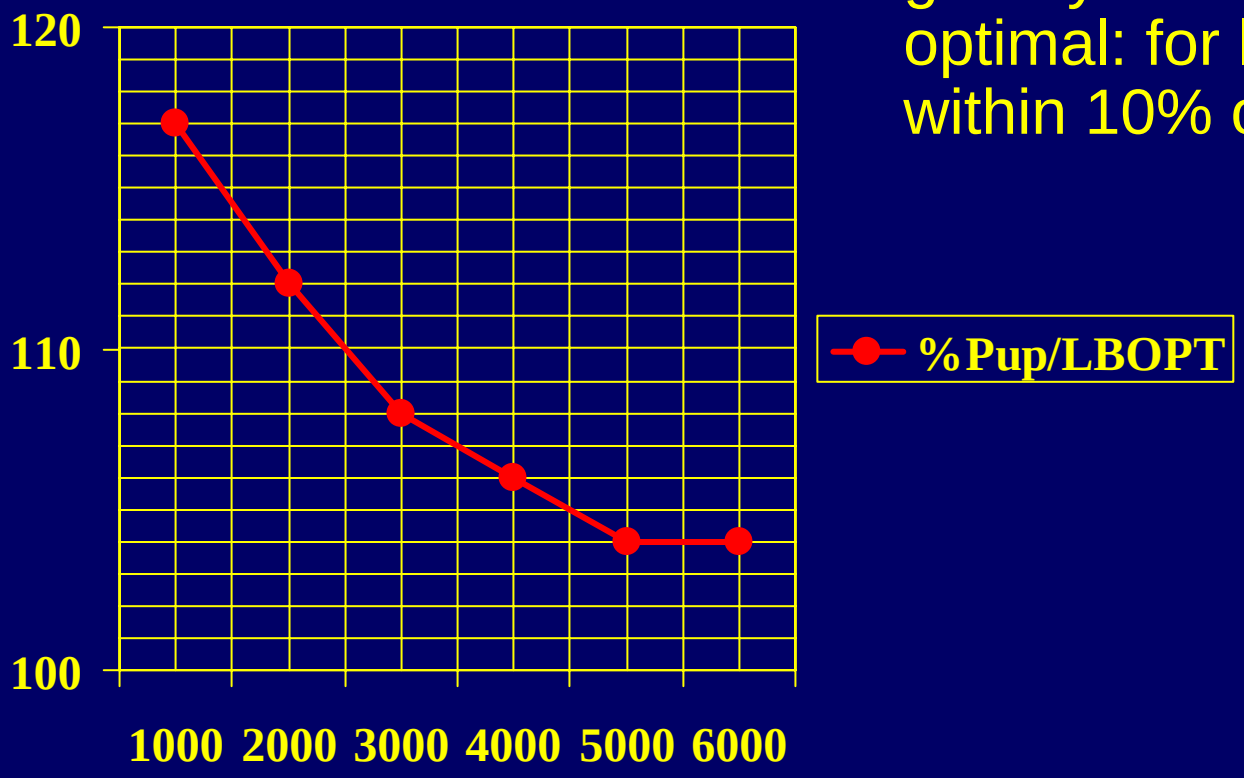
Proof: lots of mathematics and lots of complex mathematics lots of even worse mathematics and lots and lots of mathematics lots of mathematics lots of mathematics lots of mathematics lots of mathematics lots of mathematics and even more complicated mathematics and more and an incredible amount of mathematics and lots of mathematics lots of mathematics and lots and lots of mathematics lots of mathematics lots of complicated mathematics lots of mathematics lots of mathematics lots of mathematics and of mathematics lots of complicated mathematics lots of mathematics lots of mathematics lots of mathematics and ……

# Plotter Optimisation

## ***Experimental Evaluation***



# Plotter Optimisation

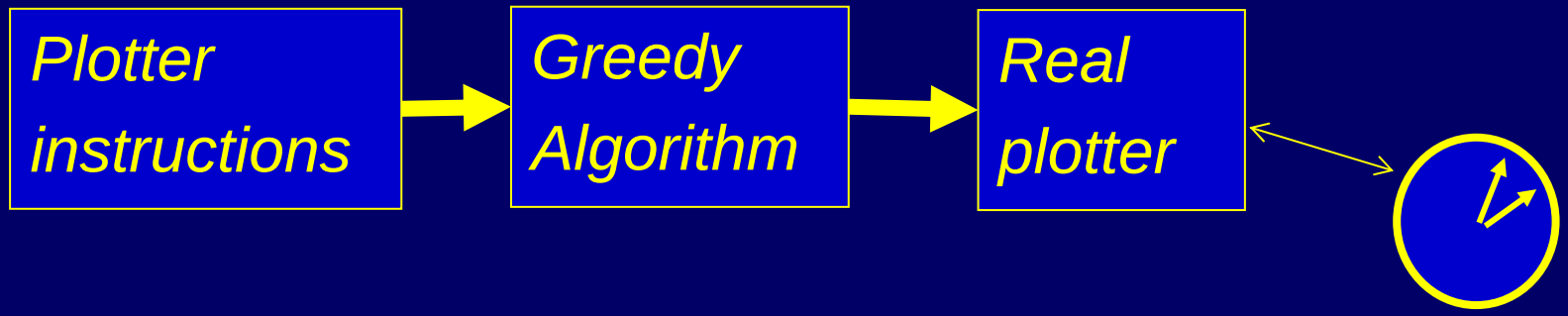



Experiments showed that greedy is very close to optimal: for larger plots it is within 10% of optimal.

BUT . . .

***Experimental Evaluation***

*We replaced the quality evaluation with a real plotter*




And timed the real plotter using the wall clock. The customer was happy, but it revealed two problems:

a) The model was wrong,

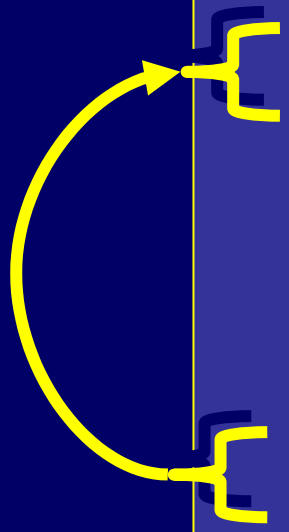
b) The greedy algorithm was too expensive.

# Plotter Optimisation

*The research procedure*

1. The customer has a problem.
2. The researcher produces an initial model of the problem.
3. *Repeat*
   a) The researcher solves the problem, according to the model.
   b) The researcher evaluates the solution of the model problem.
   c) The customer evaluates the solution to the real problem.
   d) The researcher adjusts the the model.

   ***Until*** the customer is satisfied.



# Plotter Optimisation

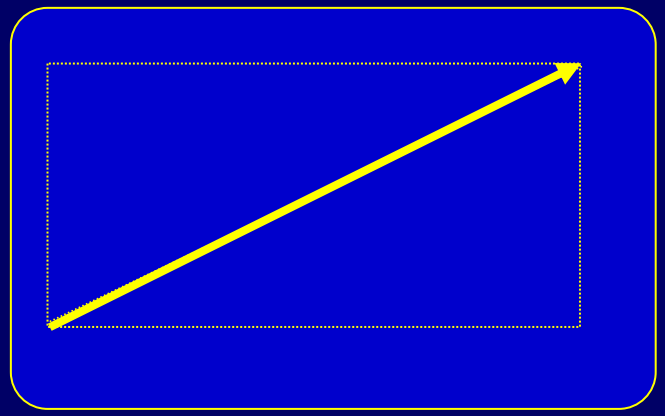
***a) <u>Our model was wrong</u>***

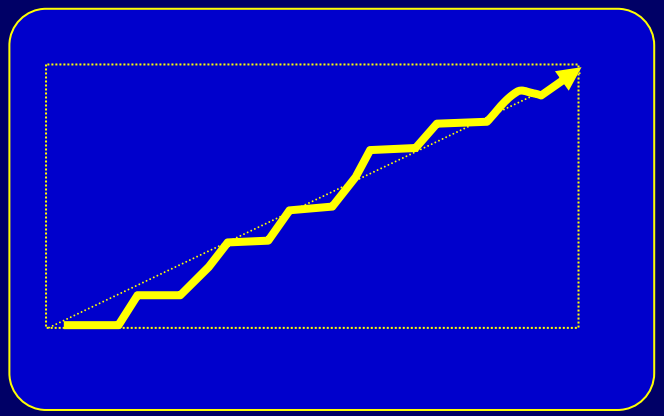
At a micro-level, the plotter pen moved in three ways:

- Horizontally
- Vertically
- (some plotters) At 45$^{o}$ to horizontal

Each micro-movement takes one unit of time.

This implies that the distance function is $L^{\infty}$ rather than $L^{2}$.





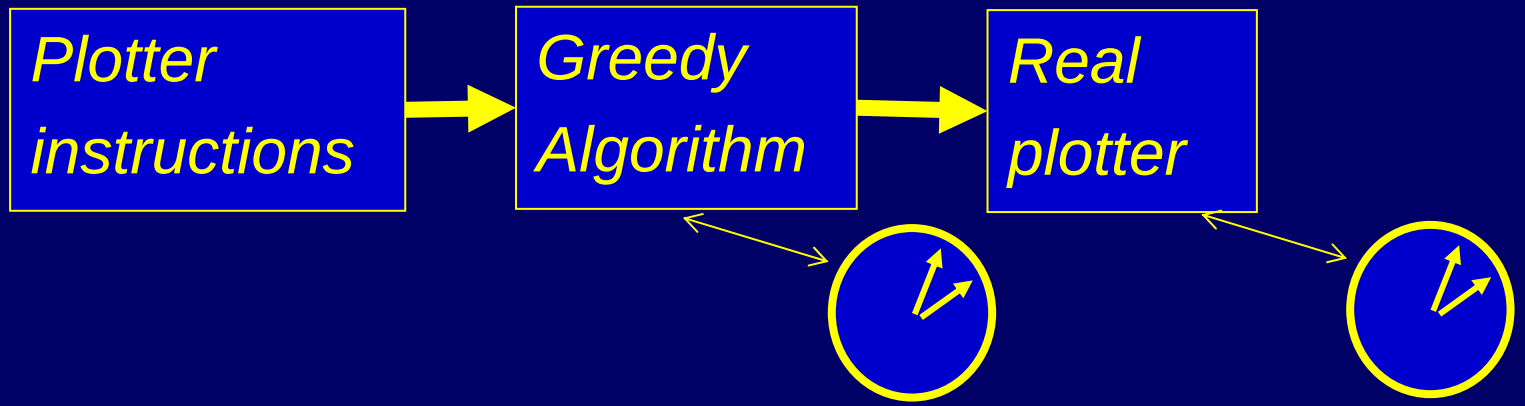
***Mathematical Evaluation***

It was easy to check that the mathematical results remain true for any distance function, and this change in model did not change the theorems significantly.

***Experimental Evaluation***

We repeated the experiments and the results changed a little, but the general pattern was the same.

b) **Our solution was not efficient**

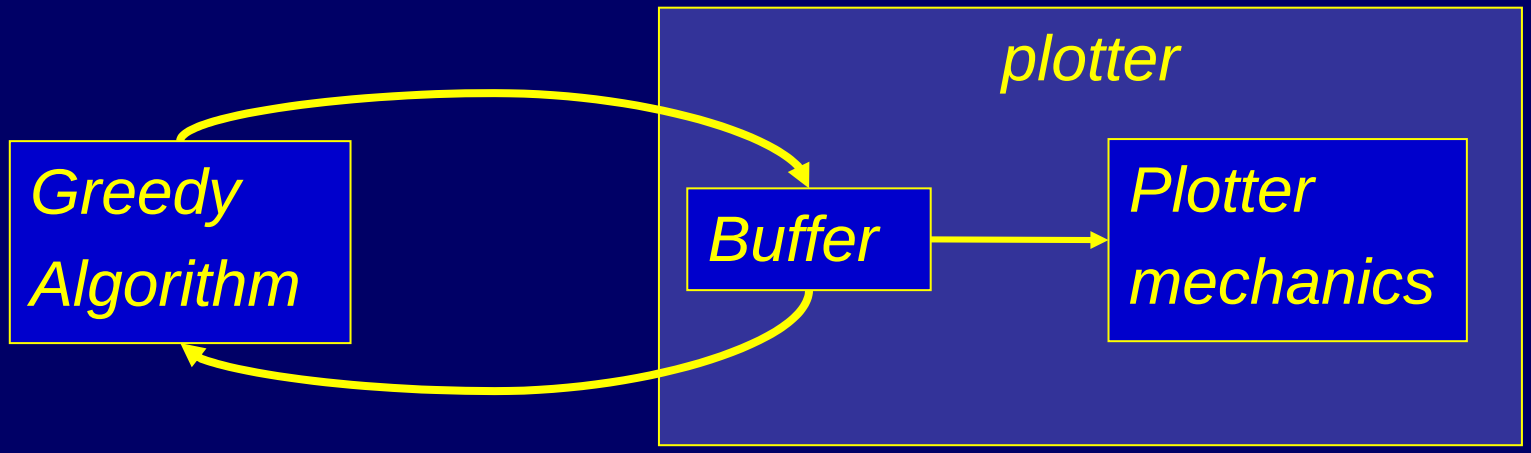



The greedy algorithm runs in time $O(n^2)$.

This was slower than the drawing procedure.

# Plotter Optimisation

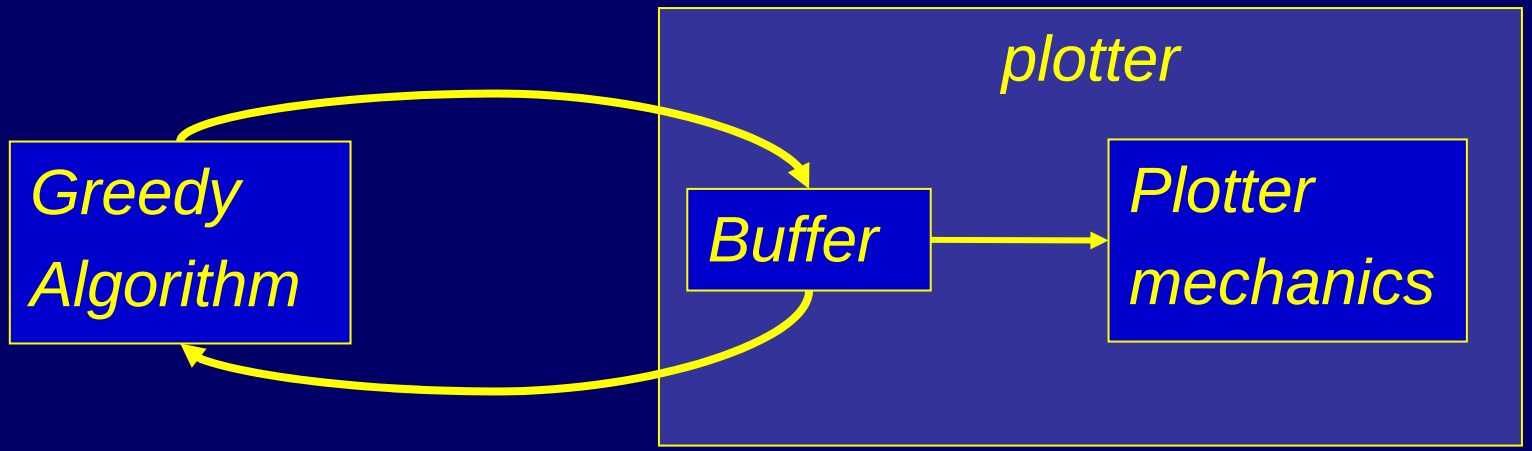
Solution: optimize one buffer-sized section at a time.




An “optimized” bufferful is sent from the greedy algorithm to the buffer whenever the plotter exhausted the current buffer.

# Plotter Optimisation

The bufferised greedy algorithm was almost as effective as the straight greedy algorithm, and much faster.



## ***Lessons from the plotter problem***

| | | |
|---|---|---|
| Mathematics | •Robust to model changes<br>•Good evaluation of pathological behavior | •Does not evaluate the model |
| Experiments | •Evaluates the model<br>•Good evaluation of normal behavior | •Poor evaluator for pathological behavior |
| UCST | •Convinces the non-scientific customer<br>•OK to evaluate elegance | •Poor evaluator of efficiency / effectiveness. |

## Do Research

***My advice***

*To find a solution:*

- Use your own skills
- Read a lot
- Attend seminars and conferences

*To evaluate your solution*

- Concentrate on mathematical and experimental methods, avoid UCST
- Relate your results to $E^3$: effectiveness, efficiency and elegance

3. Present results
    a. Write papers
    b. Give talks
    c. Write a thesis

# Write good papers

3a: Write papers

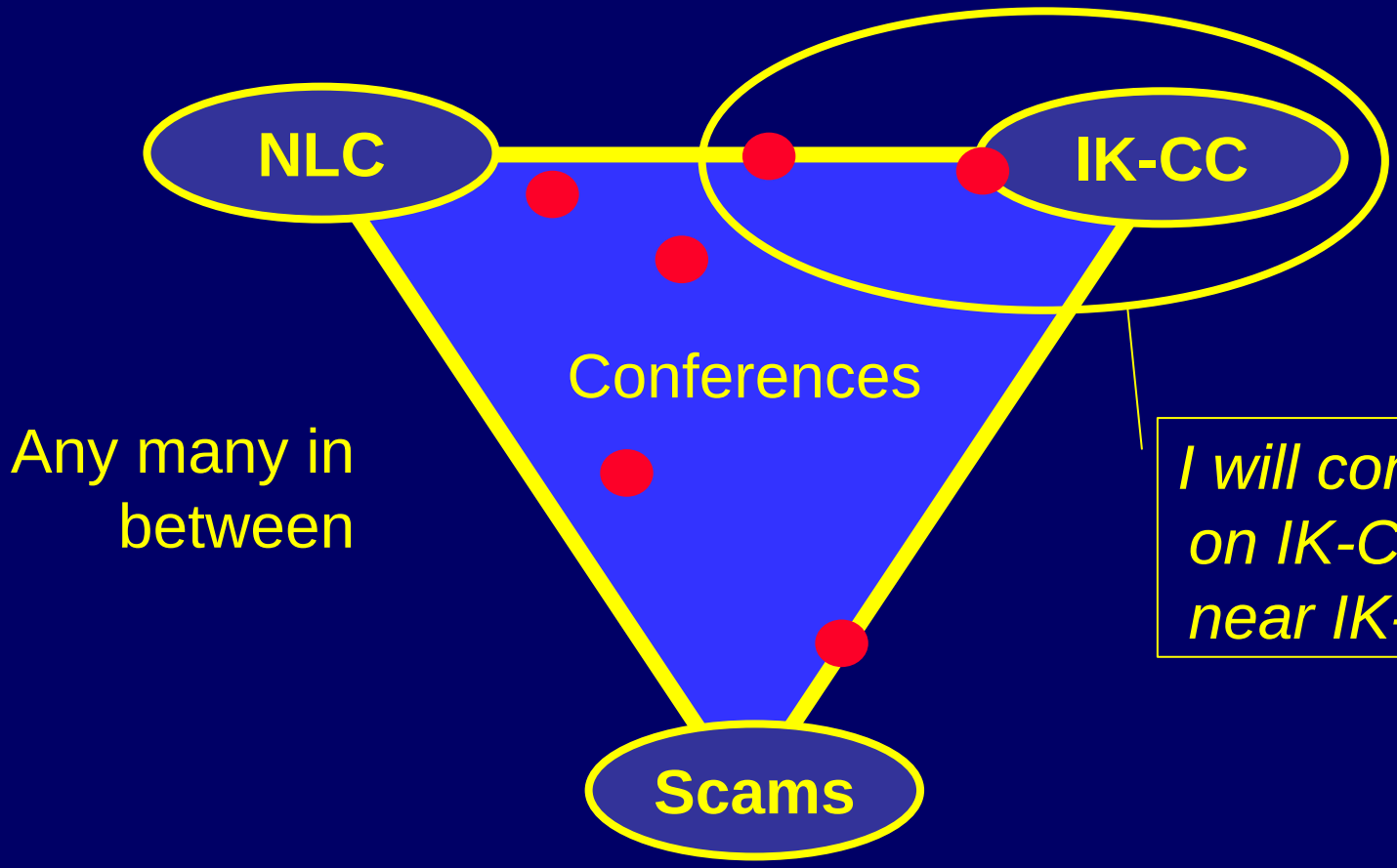
You can write

- Papers in NLCs
  - ✓ nice local conferences
- Papers in IK-CCs
  - ✓ international killer-competitive conferences
  - ✓ Rated A or $A^+$
- Papers in journals
- Chapters in books
- Books

Students mostly write conference papers; I will concentrate on this.

## Write good papers

There are three basic kinds of conferences




Any many in between

*I will concentrate on IK-CC and near IK-CC*

***How the process works***

a) You write the paper
b) You submit the paper to the program committee chair
c) The program committee chair sends it to members of the program committee (takes about a week)
d) They read it (in about 4 weeks) and write a brief report. They decide whether to accept your paper
e) If your paper is accepted, you revise the paper according to the referee's comments (2 – 4 weeks)
f) You give a talk at the conference

***How do the program committee decide which papers to accept?***

- In most cases, the papers are scored and sorted on score.
- Very few papers get a very high score or very low score.
- Accept/reject decisions for middle-score papers can be fairly arbitrary

| | | |
|---|---|---|
| *10 - 20% Obviously Accepted* | *60 - 80% random and ad-hoc decisions* | *10 - 20% Obviously Rejected* |

## Write good papers

Three steps

1. Write a good conference paper



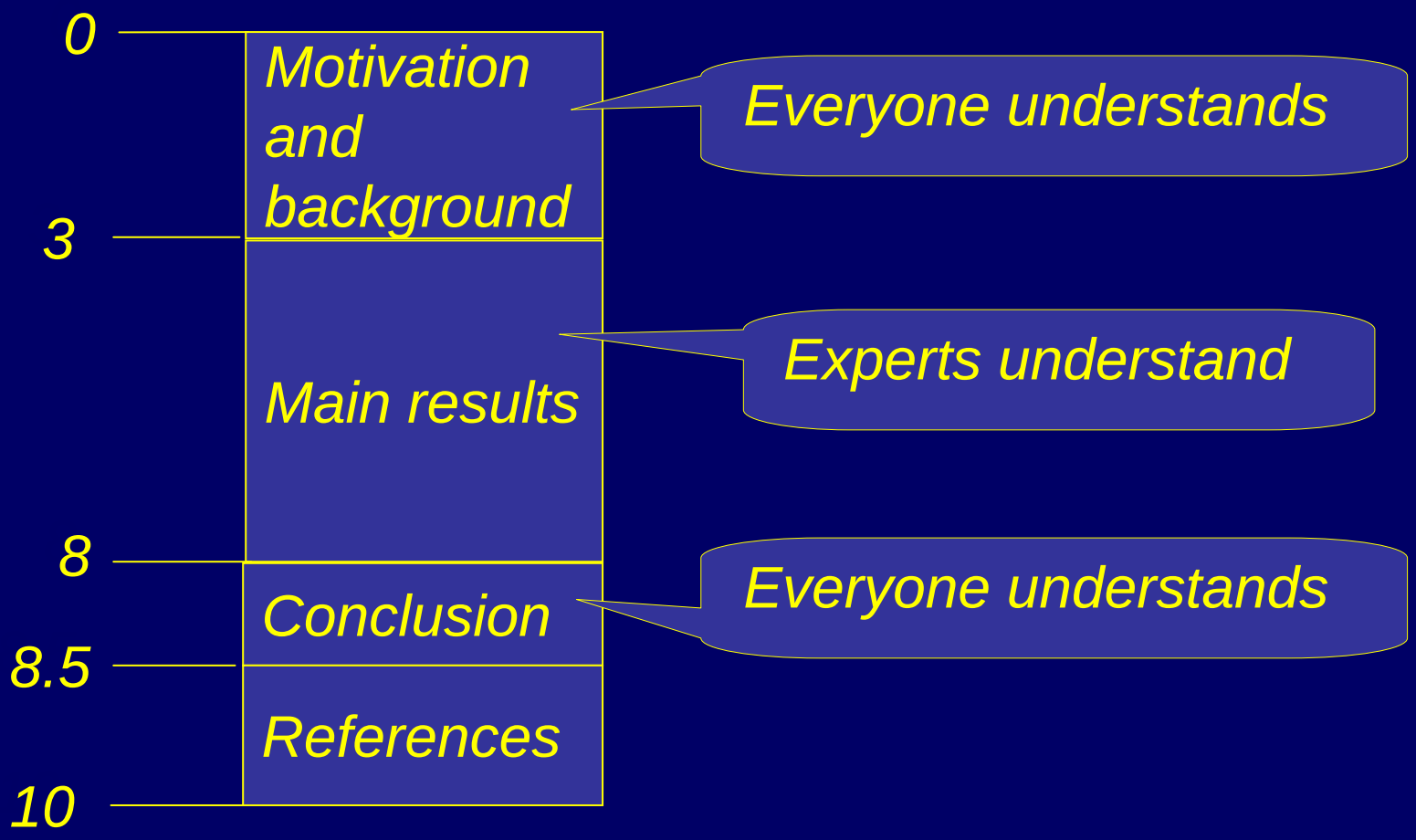
2. Choose a good conference, and adjust your paper to that conference



3. Send the paper, sit around and hope that it is accepted

1. ***Write a good conference paper***

Assuming that that the page limit is 10 pages:



## ***2. Choose a good conference, and adjust your paper to that conference***

Choose a conference

- ✓ The best conference possible (A or $A^+$)
- ✓ A good program committee
- ✓ Realistic deadline
- ✓ Avoid “scams”

Adjust your paper

- ✓ Motivation aimed toward the conference community
- ✓ Research methods that are familiar to the conference community
- ✓ Don’t insult people on the program committee

***3. Send the paper, sit around and hope that it is accepted***

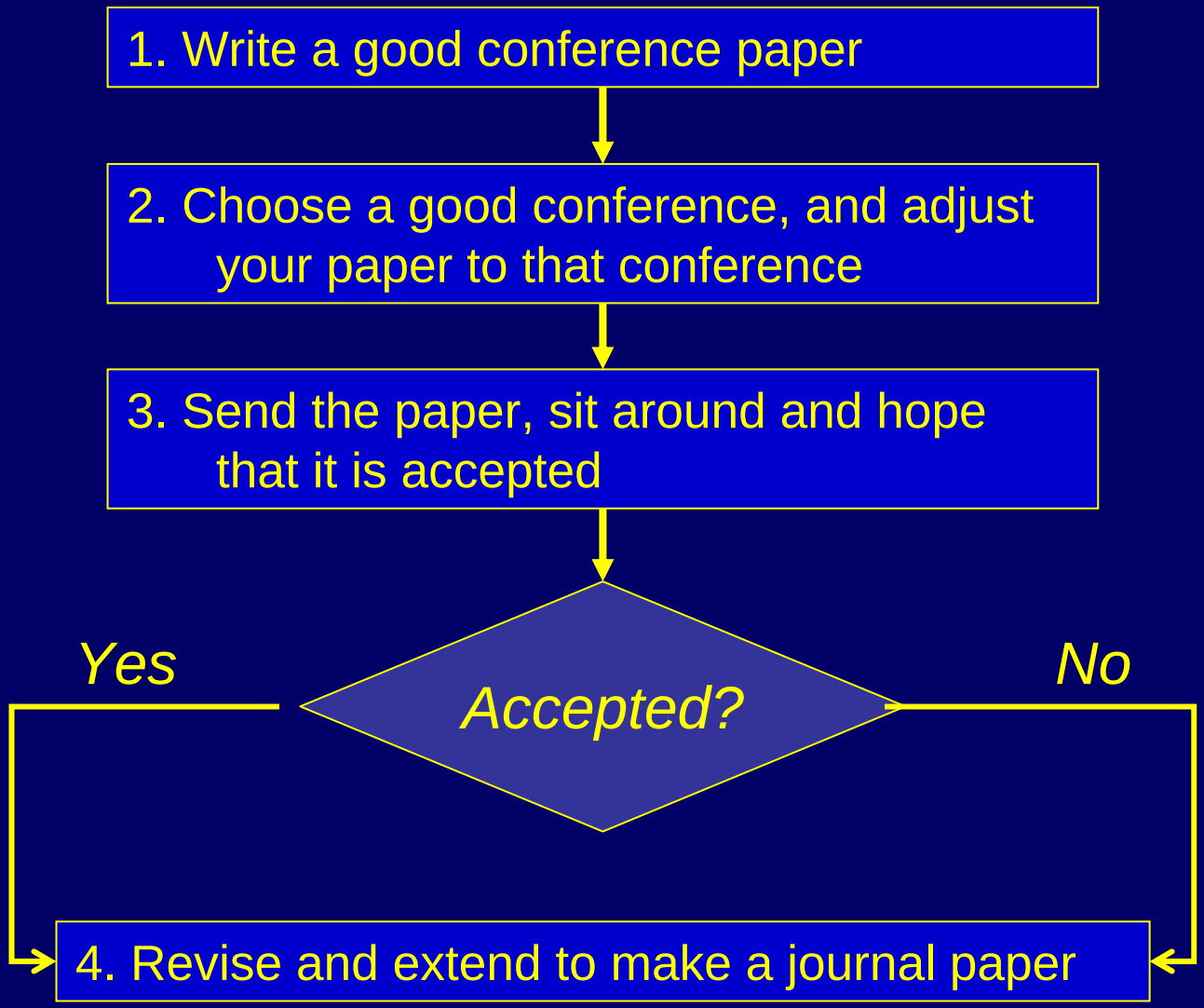
- Don’t worry if it is rejected.

***How to get your paper rejected***

The top methods

1. Write in bad English
2. Be unaware of current trends in the specific conference community
3. Organize your thoughts badly
4. Omit motivation

Extending the three steps
to write a journal paper:



3b. Give lots of good talks

***Giving a talk is beneficial to the speaker***

- It helps you
  - ✓define your problem
  - ✓understand your own work
  - ✓organize your ideas
  - ✓become famous
  - ✓write a thesis
- It brings feedback from others

## Give good talks

***You can present your research***

- At IK-CCs — *At least twice in 3 years*
- At NLCs — *Twice per year*
- To research visitors to your lab — *Often*
- As a poster / web page — *Continuously*
- At PostGrad sessions — *Often*
- To your supervisor — *Very often*
- To your associate supervisor — *Often*
- To your sister . . .

## Give good talks

***You should have three talks ready to give at any time:***

a) 30 minute talk/demo
   - ✓ For a conference, …

b) 5 minute talk/demo
   - ✓ For a research visitor, at a poster session, …

c) 30 second explanation of what your research is about
   - ✓ For when you are in the elevator, …

***How to give a talk at a conference***

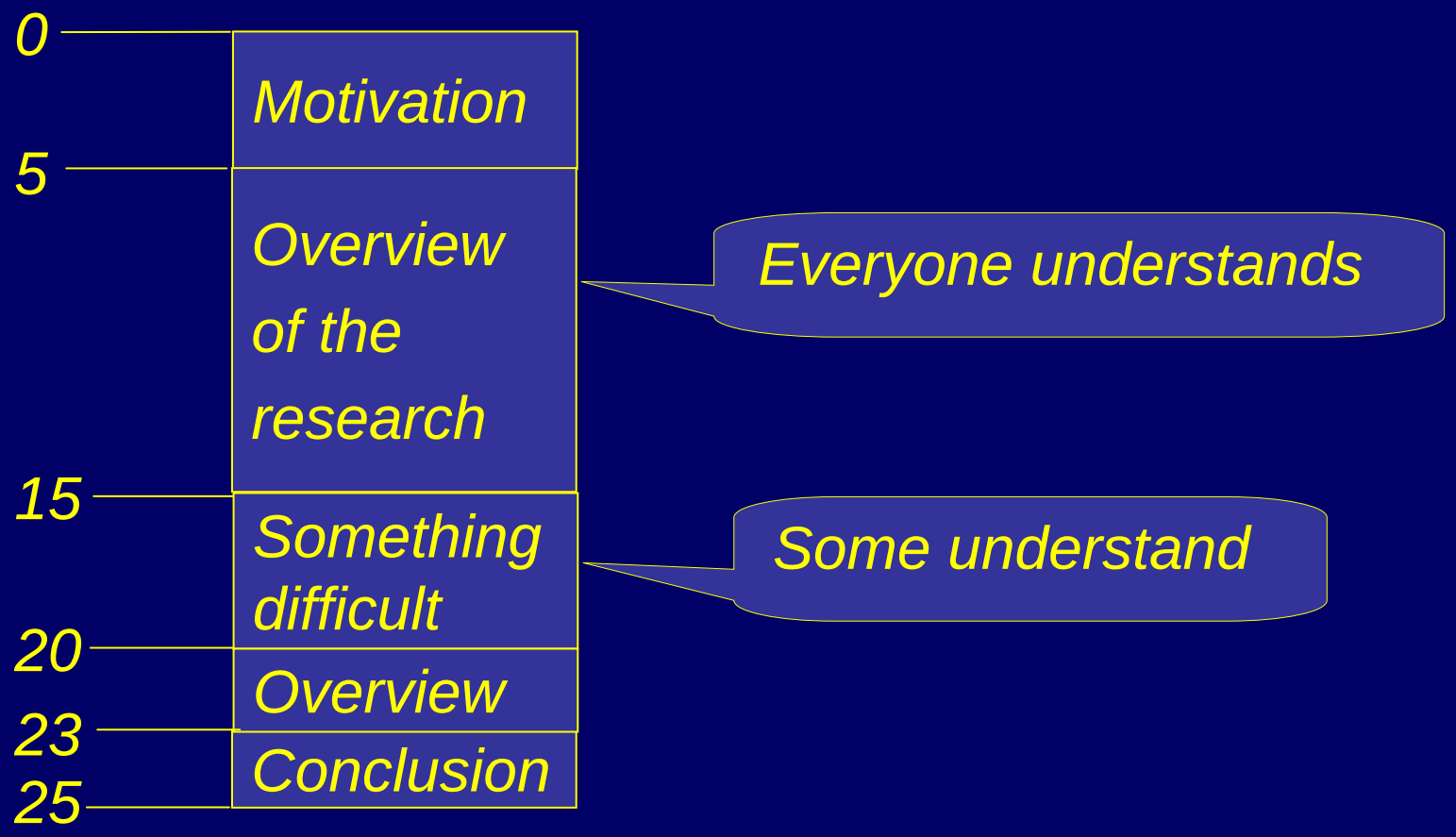
Giving a talk consists of three elements:

a) Organization
b) Talking and walking
c) Visuals

These elements vary depending on the type of presentation.

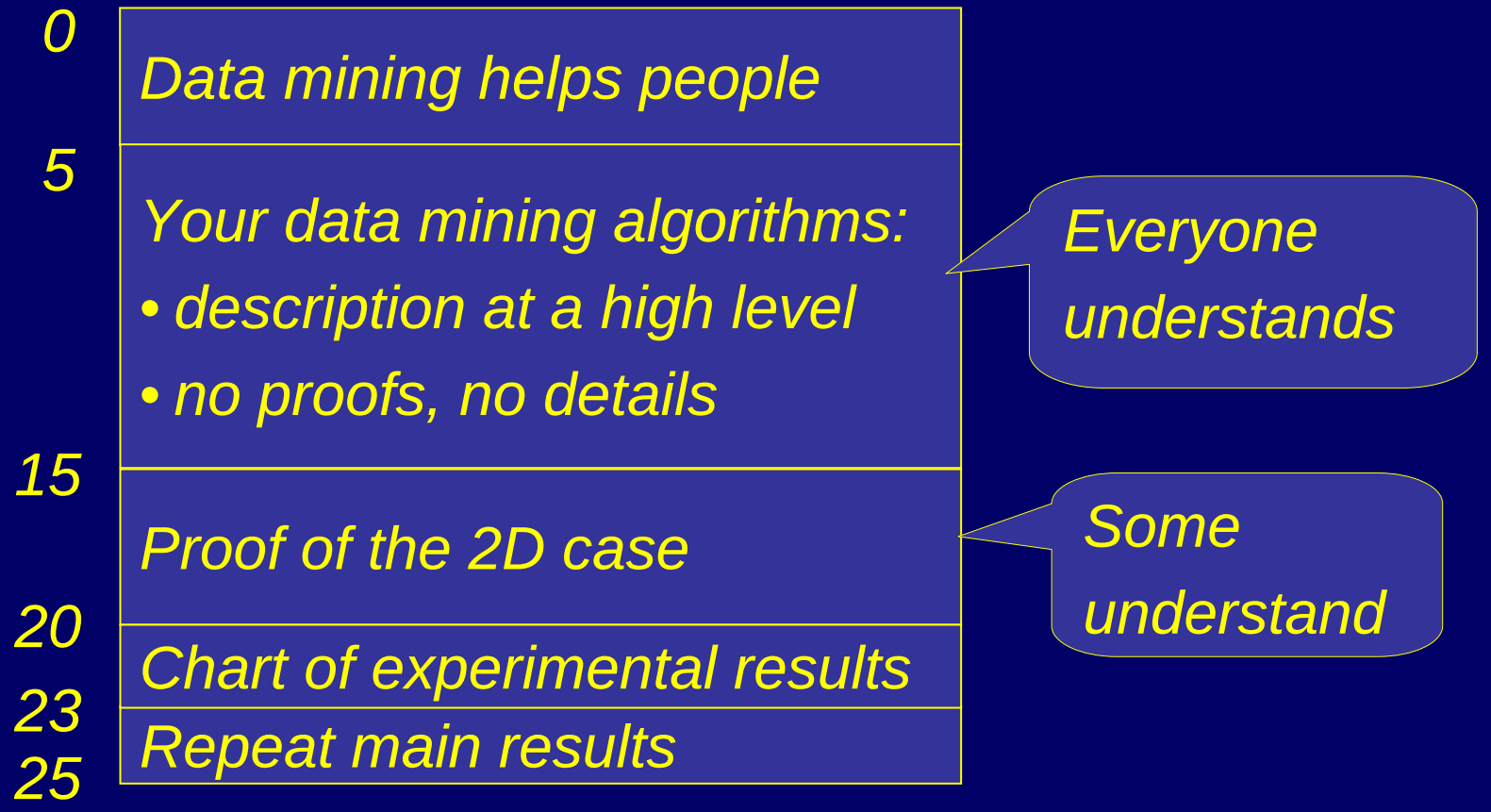
*Some comments about research conference presentations . . .*

## a) ***Organization***



Example:

Title: ***Fast spatial data mining in low dimensions***

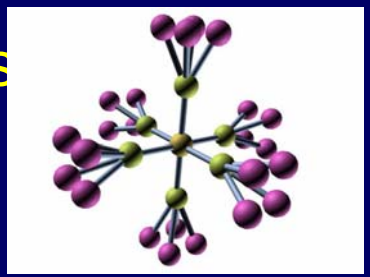


## *b) Talking and walking*

- Look at the audience as much as possible
  - ✓Choose specific people to focus on
- Speak slowly and clearly, and avoid idiomatic English
  - ✓English is a second language to most people in IT
- Use your hands for expression
  - ✓avoid holding a microphone
- Don’t waste time
  - ✓Check your data-projector/laptop connection
  - ✓Have your ppt well sorted out before you start

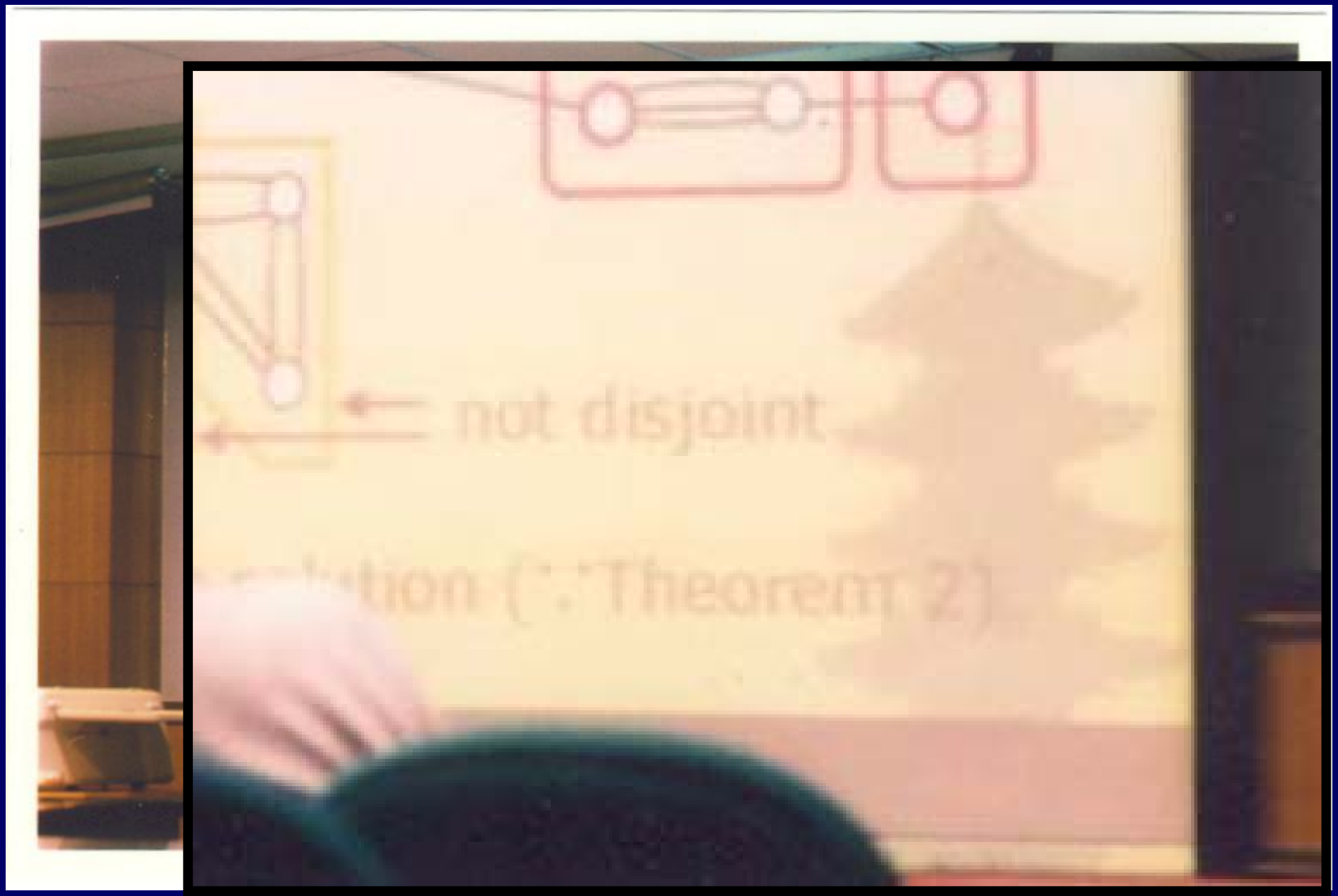
## *c) Visuals*

- Use a medium that is suitable
  - ✓Use a computer for graphics
  - ✓Use a blackboard for mathematics
- Use a medium that is well supported by the local system
- Ensure that your visuals are perfect
  - ✓No speeling errors
  - ✓No spacing errors
  - ✓Attractive layout (e.g., avoid linebreaks as much as possible)
- Don't use visuals as notes to yours
- Use pictures wherever possible
- Avoid ducks



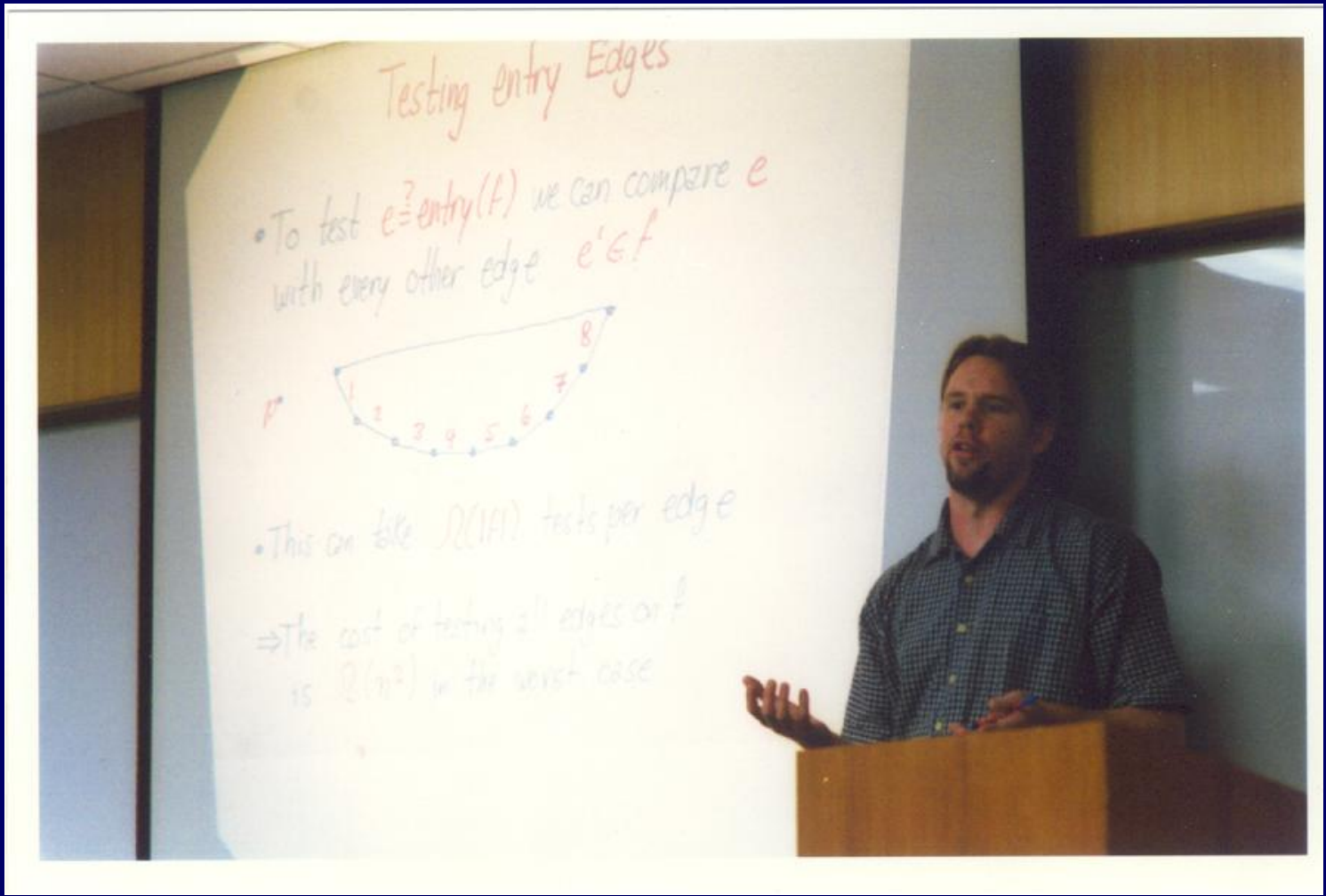
## Give good talks

*Look at the audience; avoid ducks*



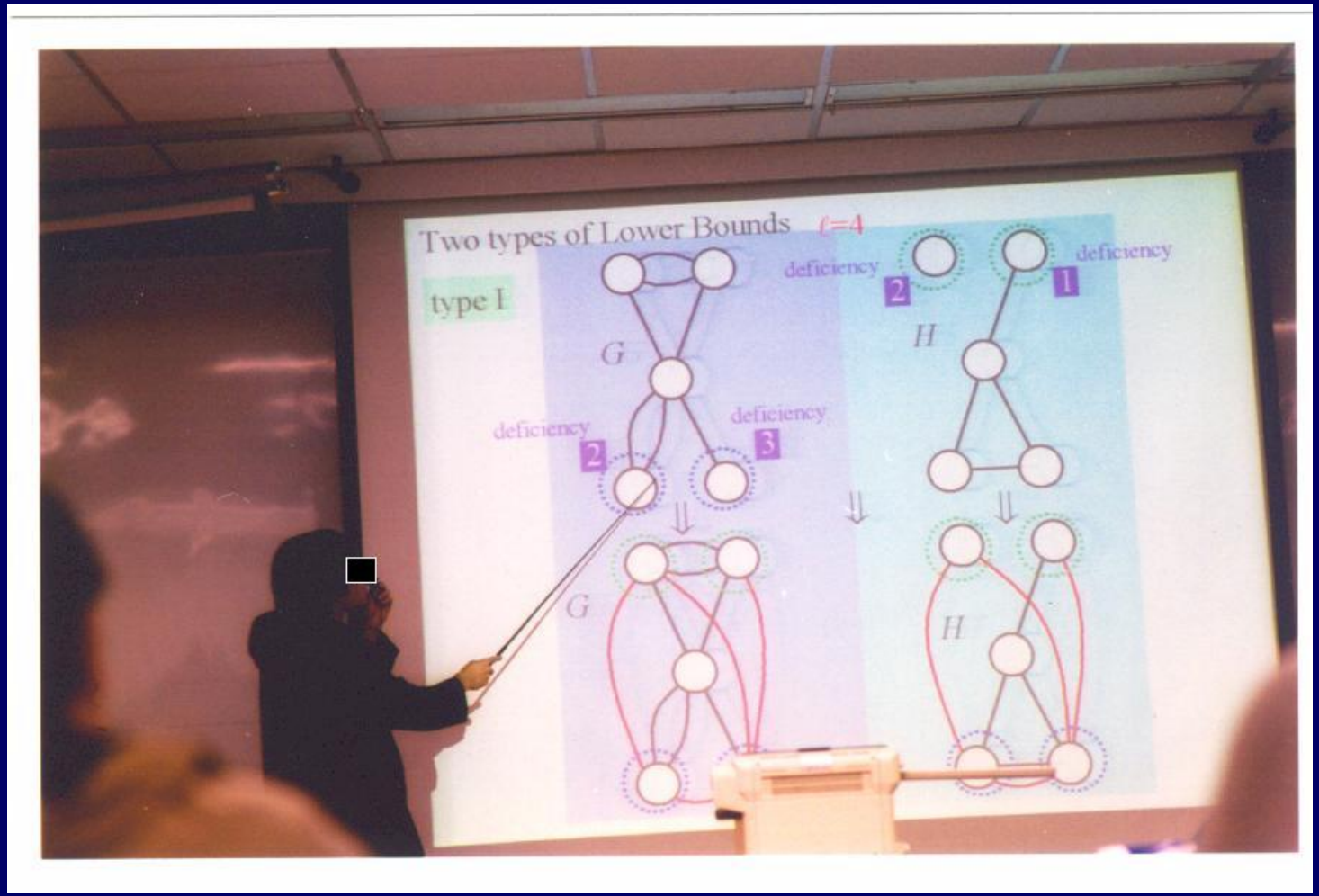
# Give good talks

*Look at the audience; use your hands*



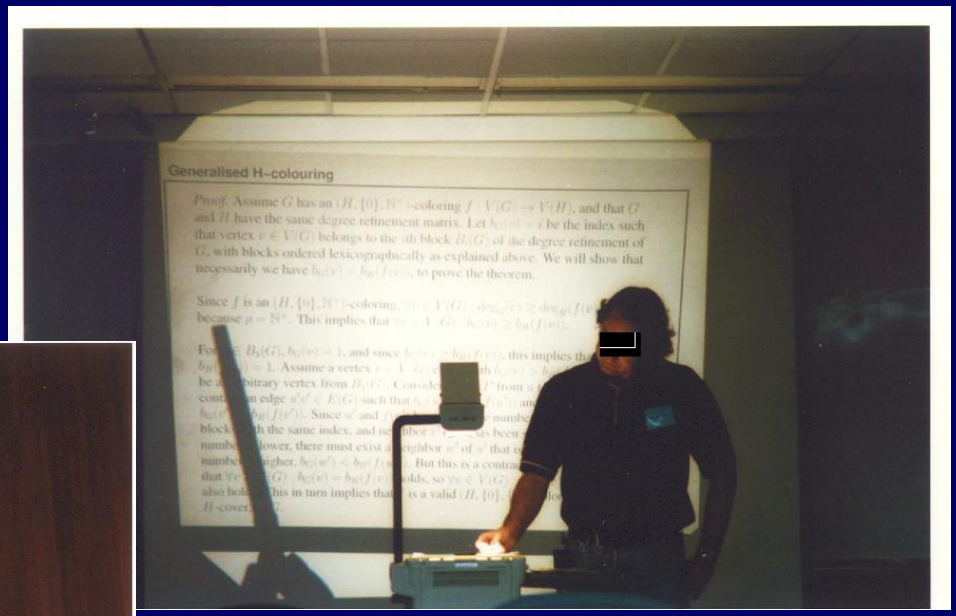
## Give good talks

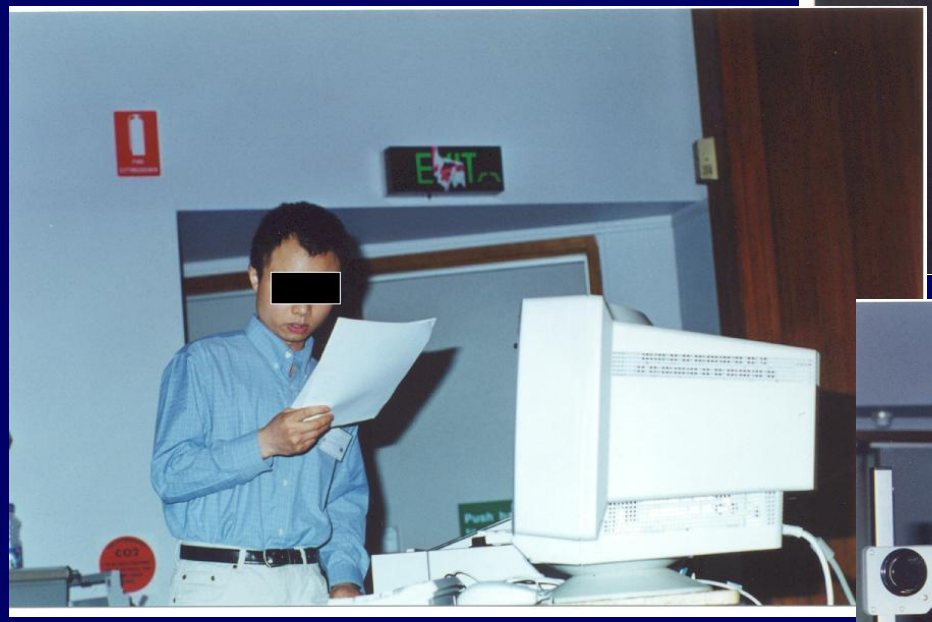
*Look at the audience; avoid holding a microphone; ensure that your slides are perfect*

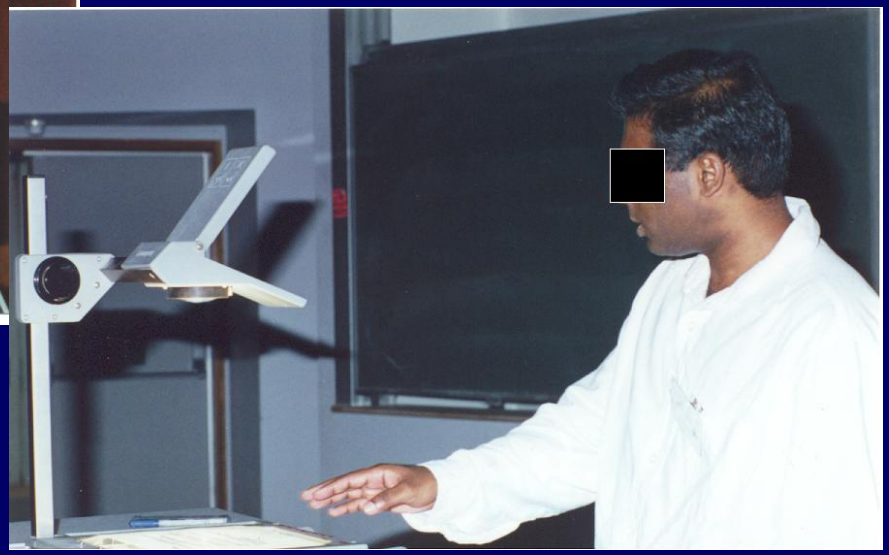


# Give good talks

*Look at the audience*

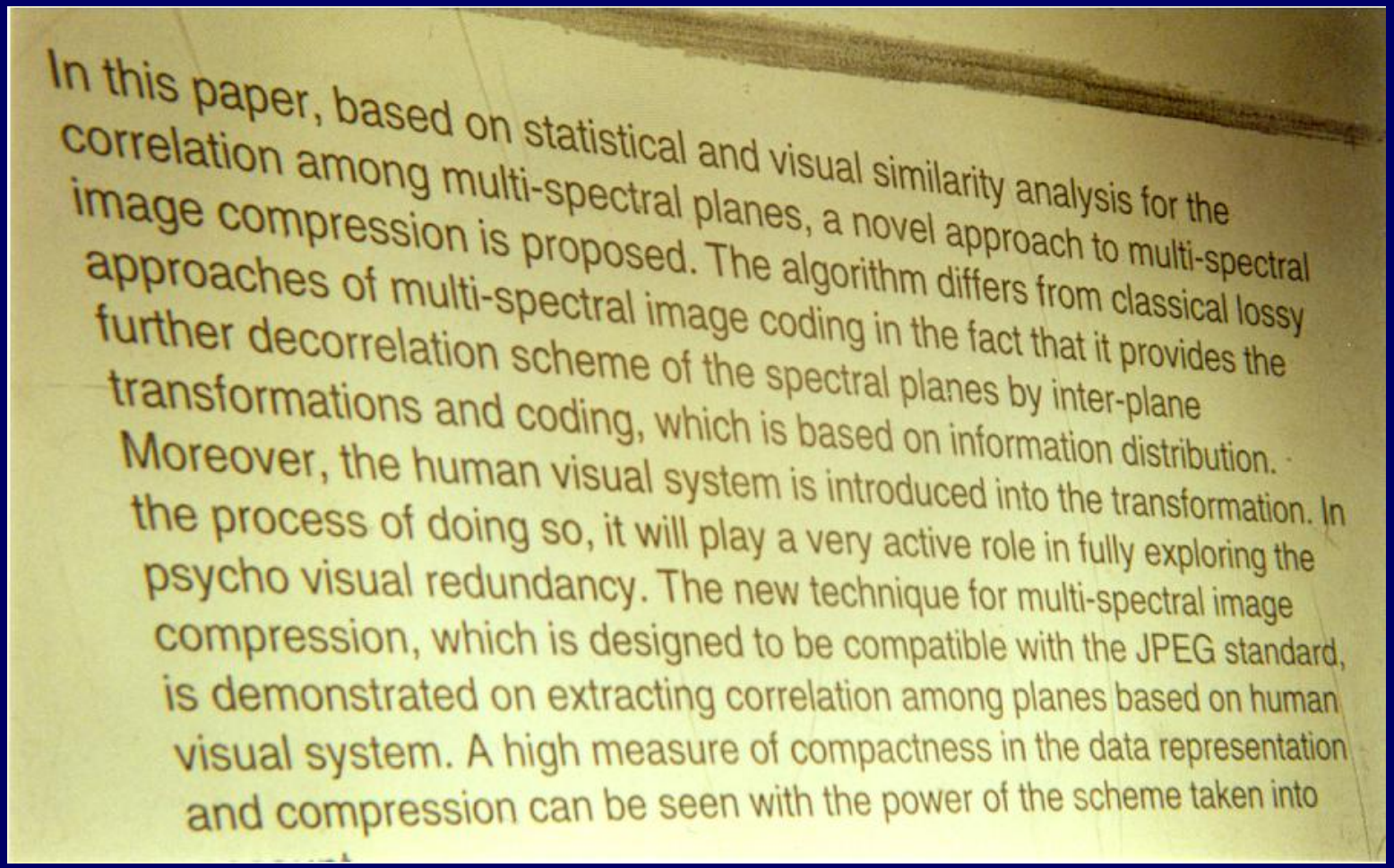


# Give good talks

*Ensure that your slides are perfect*



In this paper, based on statistical and visual similarity analysis for the correlation among multi-spectral planes, a novel approach to multi-spectral image compression is proposed. The algorithm differs from classical lossy approaches of multi-spectral image coding in the fact that it provides the further decorrelation scheme of the spectral planes by inter-plane transformations and coding, which is based on information distribution. Moreover, the human visual system is introduced into the transformation. In the process of doing so, it will play a very active role in fully exploring the psycho visual redundancy. The new technique for multi-spectral image compression, which is designed to be compatible with the JPEG standard, is demonstrated on extracting correlation among planes based on human visual system. A high measure of compactness in the data representation and compression can be seen with the power of the scheme taken into

## Give good talks

*Use the slides for the audience, not as reminders for you*

***Formal specification of Security Protocols***

- ***The need for security***
- ***The need for formal specification***
- ***Porter and Quirk's language***
- ***Inadequacies***

# Give good talks

***More advice***

- Give a practice talk to your team
- Ask people to look out for
  - errors and ducks in the visuals
  - idiomatic and ambiguous English
  - not looking at the audience

  and write it all down, and tell you
- Video the talk, look at the video

# 3c. Write a good thesis

## Write a good thesis

It is very important to write a good thesis.

Your $3^{+}$ years of PhD research are examined on the basis of:

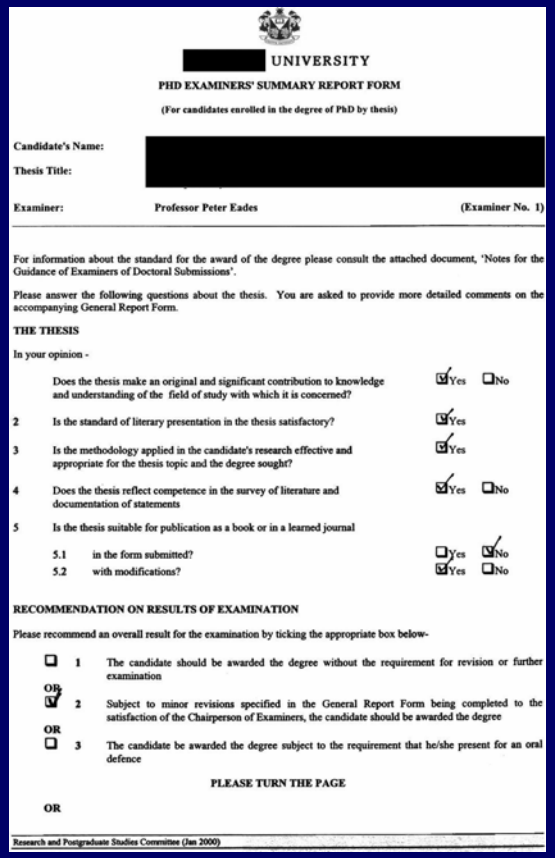
1. your thesis.
2. your thesis.
3. your thesis.

Not on the basis of

- Computer systems that you have coded
- Undergraduate tutorials that you have given
- Ideas that you have had

# Write a good thesis

The examiner reads your thesis, and not much else, then writes a very simple report.



[redacted] UNIVERSITY

PHD EXAMINERS' SUMMARY REPORT FORM

(For candidates enrolled in the degree of PhD by thesis)

Candidate's Name:

Thesis Title: [redacted]

Examiner: Professor Peter Eades (Examiner No. 1)

For information about the standard for the award of the degree please consult the attached document, 'Notes for the Guidance of Examiners of Doctoral Submissions'.

Please answer the following questions about the thesis. You are asked to provide more detailed comments on the accompanying General Report Form.

**THE THESIS**

In your opinion -

1 Does the thesis make an original and significant contribution to knowledge and understanding of the field of study with which it is concerned? ☑Yes ☐No

2 Is the standard of literary presentation in the thesis satisfactory? ☑Yes

3 Is the methodology applied in the candidate's research effective and appropriate for the thesis topic and the degree sought? ☑Yes

4 Does the thesis reflect competence in the survey of literature and documentation of statements ☑Yes ☐No

5 Is the thesis suitable for publication as a book or in a learned journal

5.1 in the form submitted? ☐Yes ☑No

5.2 with modifications? ☑Yes ☐No

**RECOMMENDATION ON RESULTS OF EXAMINATION**

Please recommend an overall result for the examination by ticking the appropriate box below-

☐ 1 The candidate should be awarded the degree without the requirement for revision or further examination

OR

☑ 2 Subject to minor revisions specified in the General Report Form being completed to the satisfaction of the Chairperson of Examiners, the candidate should be awarded the degree

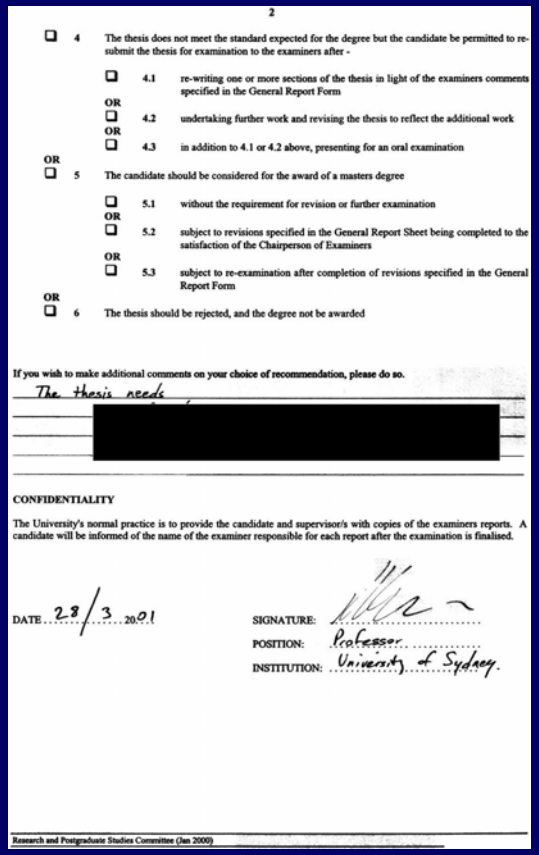
OR

☐ 3 The candidate be awarded the degree subject to the requirement that he/she present for an oral defence

**PLEASE TURN THE PAGE**

OR

Research and Postgraduate Studies Committee (Jan 2000)



2

☐ 4 The thesis does not meet the standard expected for the degree but the candidate be permitted to re-submit the thesis for examination to the examiners after -

☐ 4.1 re-writing one or more sections of the thesis in light of the examiners comments specified in the General Report Form

OR

☐ 4.2 undertaking further work and revising the thesis to reflect the additional work

OR

☐ 4.3 in addition to 4.1 or 4.2 above, presenting for an oral examination

OR

☐ 5 The candidate should be considered for the award of a masters degree

☐ 5.1 without the requirement for revision or further examination

OR

☐ 5.2 subject to revisions specified in the General Report Sheet being completed to the satisfaction of the Chairperson of Examiners

OR

☐ 5.3 subject to re-examination after completion of revisions specified in the General Report Form

OR

☐ 6 The thesis should be rejected, and the degree not be awarded

**If you wish to make additional comments on your choice of recommendation, please do so.**

The thesis needs [redacted]

**CONFIDENTIALITY**

The University's normal practice is to provide the candidate and supervisor/s with copies of the examiners reports. A candidate will be informed of the name of the examiner responsible for each report after the examination is finalised.

DATE 28/3/2001 SIGNATURE: [signature]

POSITION: Professor

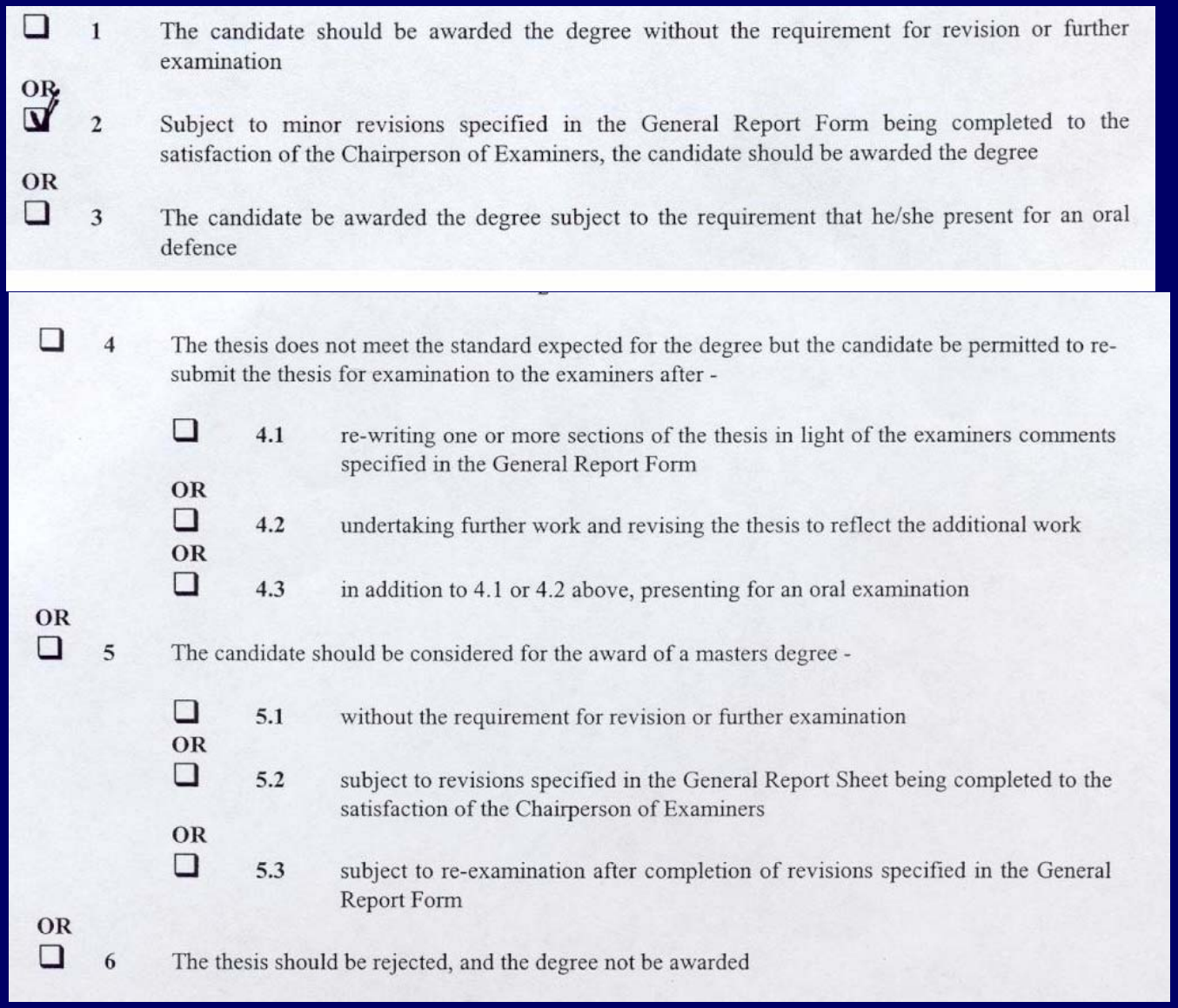
INSTITUTION: University of Sydney.

Research and Postgraduate Studies Committee (Jan 2000)

*Plus three or four pages of comments . . .*

# Write a good thesis

Your examiner basically just ticks a box



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OR

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OR

- ☐ 5.3 subject to re-examination after completion of revisions specified in the General Report Form

OR

☐ 6 The thesis should be rejected, and the degree not be awarded

## Write a good thesis

Your examiner basically just ticks a box

- ☐ 1. Award a PhD
- ☐ 2. Award it after some minor corrections
- ☐ 3. Award it as long as the student makes some corrections
- ☐ 4. Ask the student to rewrite part (or all), and re-submit
- ☐ 5. Tell the student to go away.

***Evaluation of a thesis***

Examiners are basically asked:

*"Is this a good thesis?"*

The evaluation measures vary from one University to another.

Some typical measures:

- Original and significant contributions
- Methodology
- Expression
- Scholarship, reference to literature

***Length***

The research content of a thesis should be about 3 good journal papers.

However, *a thesis is different from a paper*

- It has to tell a single story
- More background
- More references
- Extensive evidence of all the claims
- Justification of the research methodology

## Write a good thesis

***My advice***: before you begin to write:

- Carefully read at least one thesis from someone outside your field.
- Read at least 3 examiners reports

# Write a good thesis

***My advice***: The writing process

- Take 3 – 4 months
- Write about 150 pages; about 3 pages per day for the first draft
- Ensure that your supervisor reads every word
- Get someone outside your field to read the introduction
- List your original contributions in the first chapter

***How to get your thesis rejected***

Some top methods

1. Take a job before you submit
2. Teach more than one undergraduate unit
3. Don’t evaluate your solutions
4. Ignore feedback
5. Be unaware of current trends in your research community
6. Organize your thoughts badly
7. Write a very long thesis

***Topics that I have not mentioned***

1. Part-time or full-time?
2. Managing your time
3. Three stages of a PhD candidature
   a) Learning
   b) Research
   c) Writing
4. What do you do when something goes wrong?
5. PhDs and careers
   a) What kind of PhD leads to an industrial career?
   b) What kind of PhD leads to an academic career?

***Conclusion***

1. Find a good topic
2. Do Research
3. Present your research
    a) Give lots of good talks
    b) Write lots of good papers
    c) Write a good thesis

*4. Have fun . . .*