Scientific Communication in English

Human communication is not mathematics.

No right answer. No wrong answer.
Only good communication and bad communication.
You can only learn good communication by experience.

This course will help you get started. Course content:
- How to communicate effectively.
- How to recognise good and bad style.
- How the scientific communication process works.

Assessment and Schedule

Assessment:

- One page (A4) essay. 400 – 500 words maximum.
  Title: My Research
- Oral presentation. One slide, 3 minutes maximum plus
  2 minutes for questions. Title: My Research.

Schedule:

- Thursday 13 October, lectures and exercises, writing/publishing.
- Thursday 20 October, lectures and exercises, publishing/oral.
- Thursday 27 October, oral presentations.
- Friday 4 November, deadline for submitting essay.
  Essays should be printed or written on paper and submitted
  to the Teaching Office (Room 208).

Scientific Communication – What do you think?

Why do scientists communicate?

So that others benefit from their discoveries; To get research money; To educate others. Etc.

What do scientists communicate?

Research results; Research proposals; Scientific knowledge. Etc.

How do scientists communicate?

Write papers; Participate in conferences; Talk to each other. Send email. Etc.

Who do scientists communicate with?

Other scientists; Funding agencies; Students; The general public. Etc.

Good Communication

"An artist is a person who has something to say and knows how to say it." - Mr Philips, my high school teacher.

"So is a scientist." - PAM.

But Mr Philips did not explain that how we say it depends on what we say and who we talk to.

Let's see how authors adjust their style to communicate clearly and meet the needs of the reader.

Instruction Manual

Instructions for Installation and Use

6kg Washer Dryer
Aquarius
Aquarius+

Starting a typical wash and dry programme

1. Switch the machine **on** by pressing the On/Off button.

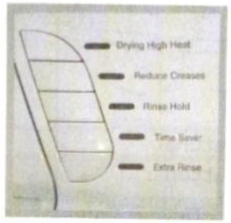
2. Sort your **laundry** into groups by washcare labels. Load the machine.
Close the machine door by pushing it until it clicks.

3. Add **detergent** and **fabric conditioner** to the dispenser drawer.

! Refer to detergent manufacturer's dosage instructions.

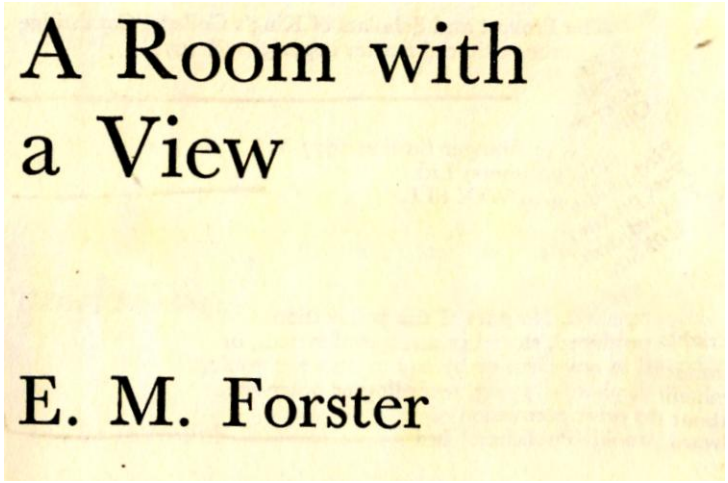
4. Turn the **programme selector** dial to the required programme.

5. Select any **optional wash feature(s)** (*see Option Modifiers*) you require by pressing the appropriate button(s).
- Indicator lights will show what you have chosen.



6. Reduce the programmes **wash temperature**:
- **Aquarius only**: Turn the Variable Temperature dial to the reduced temperature you require.
! *When the programme has finished return the dial to its maximum setting.*

Romantic Novel



1908 novel and
classic film of 1985.

George had turned at the sound of her arrival. For a moment he contemplated her, as one who had fallen out of heaven. He saw radiant joy in her face, he saw the flowers beat against her dress in blue waves. The bushes above them closed. He stepped quickly forward and kissed her.

Before she could speak, almost before she could feel, a voice called, "Lucy! Lucy! Lucy!" The silence of life had been broken by Miss Bartlett, who stood brown against the view.

Newspaper Story

UK government proposes new system for cancer diagnosis.

THE TIMES

Patients with cancer signs can bypass their GP for tests

Chris Smyth Health Editor

Patients suffering from unexplained weight loss, tiredness and breathing problems will be able to get immediate tests for cancer under trial programmes to speed up diagnosis.

Scans and tests will be carried out without the need to see a GP as health chiefs attempt to implement promises to save 30,000 lives a year by improving England's poor cancer survival rates.

Slow diagnoses are thought to be a key reason why patients are more likely to die in Britain than in many other European countries and NHS England has already promised a new target of giving patients a diagnosis within four weeks of seeing a GP.

However, many patients struggle to get GP appointments and health chiefs are also experimenting with diagnosis centres where people can refer themselves or be sent by a pharmacist.

Cally Palmer, national cancer director, said: "Too many people are being diagnosed when their cancer is advanced. Through this cancer strategy we will drive a transformation in cancer care that will touch every corner of the country."

In London, Manchester, Bristol, Oxfordshire and Yorkshire, different methods of testing patients will be compared, with the hope of implementing a national system.

Local "cancer alliances" will bring together doctors and managers to improve care, along the same lines as the cancer networks abolished by the government as part of the controversial 2012 NHS reforms.

The measures, which were welcomed by Macmillan Cancer Support, are designed to implement recommendations from experts led by Sir Harpal Kumar, chief executive of Cancer Research UK.

Jane Ellison, the public health minister, said: "We want to make the UK the best in the world for cancer care, treatment and survival."

The Times: a UK newspaper read by professional people.

GP = General Practioner. A local doctor who sees patients before they go to hospital.
NHS = National Health Service. UK provider of medical care.

Newspaper Story

DAILY Mirror

NHS CANCER DIAGNOSIS 'TO BE WITHIN 28 DAYS'

Fast track to save 30,000 lives a year

BY **ELLA PICKOVER**

PEOPLE fearing they have cancer will be diagnosed in four weeks or less under a "world class" system to tackle the disease.

NHS England also plans better prevention, while improving the experience of those who have, or had, cancer.

The 28-day target, cutting the agonising wait after being referred by a GP, is backed by a £15million investment by the National Cancer Transformation Board.

A new National Diagnostics Capacity Fund has already been created to help with the rising demand for diagnoses.

The action plan follows the NHS's Independent Cancer Taskforce report, published last year, which identified measures to save 30,000 lives a year by 2020.

NHS England says it is "committed" to delivering the strategy.

And it said it would ensure the NHS provides a "modern" service, including urgently needed updated radiotherapy machines. It was revealed in February that many of those used daily to deliver cancer treatment are years out of date.

The strategy will bring together regional experts across health and care services to pinpoint local failings in early diagnosis and survival rates, treatment outcomes, patient experience and quality of life.

Cally Palmer, national cancer director for England, said: "Cancer survival rates have never been higher and we have some excellent cancer services in this country, but we know there's more we can do.

"One in two people will be diagnosed with cancer – and too many are being diagnosed when their cancer is advanced. We need to change this." Emma Greenwood, of Cancer Research UK, said the strategy had the potential to transform peoples experiences of cancer and chances of beating the disease. She added: We urge the Government and NHS to make the investments required and implement it with commitment and speed."

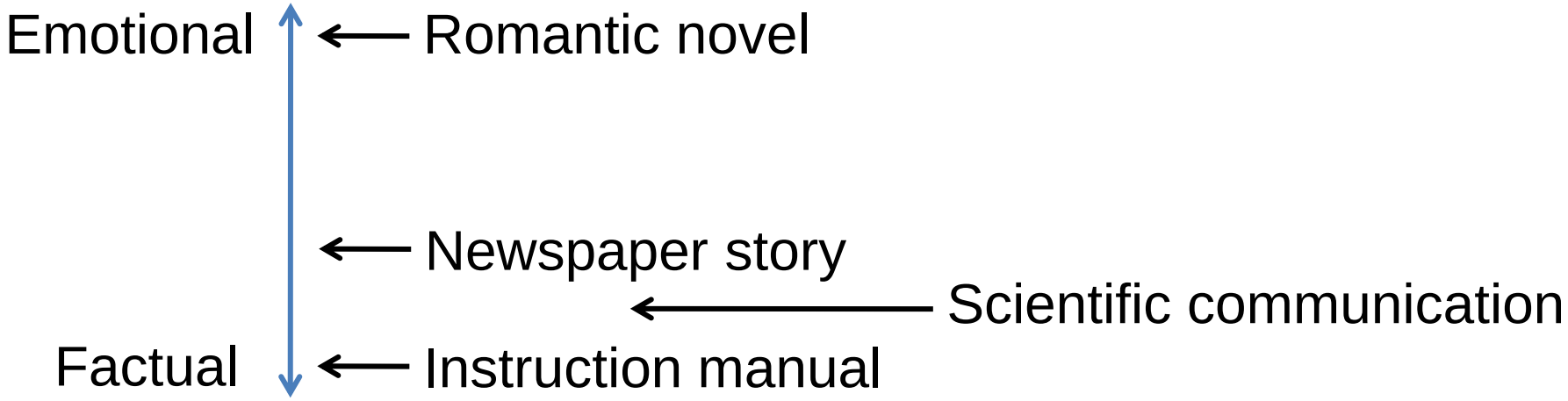
■ "Promising" new lung cancer drug Nivolumbab, said to be more effective than chemotherapy, is set to be blocked by NHS chiefs as "not cost effective".

STRATEGY Cally Palmer

mirrornews@mirror.co.uk

Daily Mirror: a UK newspaper read by everyone.

Scientific Communication Style



The purpose of scientific communication is to influence other people's thinking.
Scientific communication must be based on facts and evidence.

But the style and content must be suitable for the target audience.

Who is this writing aimed at?

Each of the four paragraphs is written for a different group of people. Look at the paragraphs and decide who they are aimed at.

Who is this writing aimed at?

Paragraph 1

Aimed at graphene specialists. From an archival journal.

M. T. Allen, J. Martin and A. Yacoby, Nat. Comm. **3**, 934 (2012).

Paragraph 2

Aimed at condensed matter physicists. From a review journal.

A. H. Castro Neto, F. Guinea, N. M. R. Peres, K. S. Novoselov and A. K. Geim, Rev. Mod. Phys. **81**, 109 (2009).

Paragraph 3

Aimed at all physicists. From a UK physics magazine.

K. S. Novoselov, Physics World, August 2009.

Paragraph 4

Aimed at the general public. From a science magazine.

A. K. Geim and P. Kim, Scientific American, April 2008.

Structured Communication

Communication is not random process. It has structure.

Basic pattern is: Introduction - Main Body – Conclusion
Let’s look at an example.

We use this structure because everyone expects it.
If you give people what the expect, they are more likely to accept what you say.

Structured Communication: Example

Correlation between galaxy rotation and visible matter puzzles astronomers
Physics World News Story, October 2016

A new study of the rotational velocities of stars in galaxies has revealed a strong correlation between the motion of the stars and the amount of visible mass in the galaxies. This result comes as a surprise because it is not predicted by conventional models of dark matter.

Introduction

Stars on the outskirts of rotating galaxies orbit just as fast as those nearer the centre. This appears to be in violation of Newton's laws, which predict that these outer stars would be flung away from their galaxies. The extra gravitational glue provided by dark matter is the conventional explanation for why these galaxies stay together. ..

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Main Body

The result is confounding because galaxies are supposedly ensconced within dense haloes of dark matter. Furthermore, the team found a systematic deviation from Newtonian predictions, implying that there is some other force is at work beyond simple Newtonian gravity.

Conclusion

Structured Communication: the Most Important Part

Introduction - Main Body – Conclusion
Which is the most important part?

Answer: the introduction.

You cannot force the reader to read.
You cannot force the audience to listen.
You have to make the presentation interesting for them.

If your introduction is not interesting, they will ignore everything else you say.
Therefore the introduction is the most important part.

Preparing Structured Communication

You cannot just write.
You cannot just speak.
Preparation is the key to success.

You have to write papers and a thesis.

These are very long documents.
So we will focus on essays – the simplest form of structured communication.

If you can write a good essay you can write anything.

Essays

Basic pattern: Title - Introduction - Main Body – Conclusion
Plus references if needed.

Specification of the essay for this course:

Title: My Research
Target Audience: Graduate Students
Length Limit: 400 – 500 words (1 A4 page, maximum)

Must be attractive to read, presented in logical order with reasons and evidence plus references if needed.

How do we write an essay to this specification?
First we write a plan.

Planning an Essay

1. Ask who am I writing for?
2. Ask how many words do I have?
3. Decide what to say.
4. Decide what goes in the main body.
5. Decide what the conclusion is.
6. Write notes on main body and conclusion.
7. Does main body contain all the evidence needed to support the conclusion? If not revise main body and conclusion.
8. Decide what goes in the introduction. The introduction introduces your essay. You cannot plan the introduction until you have planned the main body and conclusion.
9. Complete the plan.

Example Plan

Negative Electronic Refraction in Bilayer Graphene

Introduction:
Negative refraction in optics
Negative and positive refraction in bilayer graphene
Purpose of this research

Main Body:
Bilayer graphene band structure
Regions of positive and negative refraction
Birefringence
Effect demonstrated numerically
Currently developing code for detailed analysis of scattering

Conclusion:
Negative refraction and birefringence occur in bilayer graphene
Further work may lead to new electronic devices

Write Your Own Plan

Each group should write a plan for a one page essay.
Choose your own title.
After you have finished, write your plan on the whiteboard.

After we Have the Plan

We convert the plan into words, sentences and paragraphs.

Writing Paragraphs

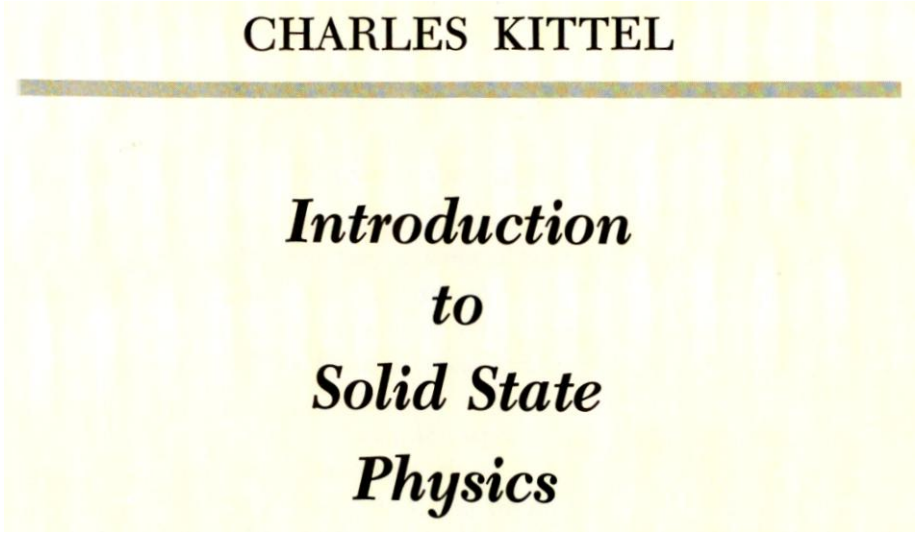
- Each new idea needs a new paragraph.
- Each paragraph is a mini-essay.

Paragraph structure:
Opening sentence – introduces the new idea.
Main body – describes the idea.
Closing sentence – either summarizes the paragraph contents or leads to next paragraph.

Each paragraph must start with a strong opening sentence. Just by reading the opening sentence, the reader can guess what comes next.

Let's look at some examples.

Example Paragraph with Conclusion



Charles Kittel – physicist and best selling author.

The electronic configurations of all ions of a simple ionic crystal correspond to closed electronic shells, as in the inert gas atoms. In lithium fluoride the configuration of the neutral atoms are, according to the periodic table in the front end papers of this book, Li: $1s^2 2s$, F: $1s^2 2s^2 2p^5$. The singly charged ions have the configurations Li^+: $1s^2$, F^-: $1s^2 2s^2 2p^6$, as for helium and neon, respectively. Inert gas atoms have closed shells, and the charge distributions are spherically symmetric. We expect that the charge distributions on each ion in an ionic crystal will have approximately spherical symmetry, with some distortion near the region of contact with neighboring atoms. This picture is confirmed by x-ray studies of electron distributions (Fig. 9).

Example Paragraph with Continuation

In Fourier space the selection rules (37) and (38) have the geometrical significance shown in Fig. 20b. Notice that the length of the vector $\mathbf{k}'$ will be equal to the length of $\mathbf{k}$ if $\mathbf{k}'$ terminates somewhere on the spherical surface of radius k. Furthermore, if both $\mathbf{k}$ and $\mathbf{k}'$ terminate on reciprocal lattice points they must be connected by a reciprocal lattice vector, whence it follows that $\mathbf{k}' = \mathbf{k} + \mathbf{G}$. The construction in the figure is known as the **Ewald construction** and is used particularly in the analysis of x-ray and neutron diffraction. The following section describes the Brillouin construction which is often used for the description of electron states in solids and, although rarely used for x-rays, gives a clear picture of the diffraction conditions.

BRILLOUIN ZONES

A Brillouin zone is defined as a Wigner-Seitz cell in the reciprocal lattice. (The Wigner-Seitz cell of the direct lattice was described by Fig. 1.8). The

What follows these opening sentences?

The Gaia spacecraft is elegantly simple, consisting of a circular optical bench that supports two telescopes. – Physics World

A description of the Gaia parallax measurement system.

There are several reasons why Euler's method is not recommended for practical use. – Numerical Recipes

An explanation of the disadvantages of the Euler method.

The challenge is to make an X ray beam bright enough to obtain a complete diffraction pattern from just one molecule. – Physics World

An explanation of how a bright X ray beam is obtained.

The tokamak is the most well-developed and well-funded approach to fusion energy. - Wikipedia

Statistical information on the world's tokamaks.

Writing Sentences

Important points:

-Sentences should not be very long or very short but some variety is needed to keep the reader interested.

- Grammar must be correct otherwise the sentence is difficult to read.

- Spelling must be correct otherwise the sentence is difficult to read.

If your writing is hard to read, the reader will stop reading.

Sentence Length

Paragraph A

The speed of the object was measured. The speed is distance over time. Time was measured with a stopwatch. Distance was measured with a metre ruler. The experiment was repeated 10 times. The mean speed was found.
The standard error of the mean was found.

All the sentences are short. The reader gets bored and stops reading

Paragraph B

The speed of the object was found from the time taken to travel a set distance. Time was measured with a stopwatch and distance was measured with a metre ruler. The experiment was repeated 10 times to find the mean speed and its standard error.

This is about right.

Paragraph C

The speed of the object was found by dividing the time taken, measured by a stopwatch, to travel a certain distance defined by the position difference, measured with a metre ruler, of the two set points that form the spatial interval over which the object travelled. In order to estimate the mean speed and the associated standard error of the mean speed, the experiment was repeated a number of times, 10 times in this case.

The sentences are too long and complicated. The reader stops reading.

Grammar

A experiment is performed to investigate impurities in a semiconductor surface. A semiconductor crystal is grown by MBE and transferred to UHV chamber for investigation with STM. An image is taken at constant current and features corresponding to an impurity is identified. The image is processed to enhance it's contrast. This allows to investigate the atomic structure near the impurity.

An experiment is performed to investigate impurities in a semiconductor surface. A semiconductor crystal is grown by MBE and transferred to a UHV chamber for investigation with STM. An image is taken at constant current and features corresponding to an impurity are identified. The image is processed to enhance its contrast. This allows ~~to investigate~~ the atomic structure near the impurity to be investigated.

Or

This allows us to investigate the atomic structure near the impurity.

Spelling

In an experiment to investigate the Doppler shift, sound waves are transmited by a moving source and detected by a fixed reciever. To ensure the frequency of the emitted sound is not effected by temperature, the source is mounted in a thermostatically controlled chamber, acurate to about 0.1° C. Another potential source of error is electronic noise. This is adressed by using a lock-in amplifier.

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Writing the Essay

1. Expand the plan into paragraphs. Decide what ideas to put into each paragraph.
2. Write the main body. Avoid plagiarism.
3. Write the conclusion. Avoid plagiarism.
4. Write the introduction. The introduction introduces ***your*** essay, ***not*** the general topic of the essay. Avoid plagiarism.
5. Check your writing. Ask someone else to criticise it.
6. Correct and revise your writing until you are satisfied.

Plagiarism is theft of ideas belonging to someone else. Journals check for plagiarism. If you copy someone else's writing, your paper will not be published.

Expanded Plan

Negative Electronic Refraction in Bilayer Graphene

Introduction: One paragraph .
Negative refraction in optics
Negative and positive refraction in bilayer graphene
Purpose of this research

Main Body:
One paragraph about the electronic structure of graphene.
Bilayer graphene band structure
Regions of positive and negative refraction
Birefringence

One paragraph about my results.
Effect demonstrated numerically
Currently developing code for detailed analysis of scattering

Conclusion: One paragraph .
Negative refraction and birefringence occur in bilayer graphene
Further work may lead to new electronic devices

Writing the Introduction

Get to the point quickly. Make a good impression on the reader.
Let's look at two introductions.

Good and Bad Introductions

Accelerometers for Smartphones

Everyone knows that the image on a smartphone screen rotates when the phone is rotated. But how does the smartphone know its own orientation? It uses an accelerometer to measure the acceleration due to gravity and determines its orientation from the acceleration vector. The purpose of this essay is to explain how smartphone accelerometers work and how they are used.

Gets to the point at end of paragraph 1. Good impression.

Accelerometers for Smartphones

The smartphone is a hand-held terminal device with many different functions. It can be used to access web sites, send email and make telephone calls. It also has a camera that can take still pictures and make movies. In addition most smartphones are equipped with a GPS receiver so that they can determine their location on the Earth's surface. Applications (Apps) can be downloaded to increase the smartphone's functionality.

One of the technical problems faced by smartphone designers is to determine the orientation of the phone relative to the surface of the Earth. This information is needed so that...

Does not get to the point. Bad impression.

Writing the Conclusion

Summarize the most important points. Emphasise why they are important. Let's look at two conclusions.

Good and Bad Conclusions

The accelerometers used in most smartphones are micromechanical cantilever devices in which the cantilever forms the plate of a capacitor. These devices enable the smartphone to determine its own orientation and rotate the image it displays. However they suffer from a low sampling rate, typically 50 – 100 Hz. Development of a new generation of accelerometers with higher sampling rates will enable the smartphone to be used in new areas, for example sports science and geriatric medicine.

Important points are summarized precisely. Good impression.

All smartphones contain an accelerometer. The accelerometer is used to adjust the image on the smartphone screen. The accelerometer works on micoromechanical principles. New applications of smartphone accelerometers are being developed.

Vague and unclear. Bad impression.

Good and Bad Style

Good style means easy to understand.

The golden rule is: keep it simple.

The only way to achieve this is to write and re-write until your writing is easy to understand.

Writing an Essay: Summary

1. Decide who the essay is aimed at.
   Make sure the content is suitable for the target audience.

2. Write a plan.
   The plan is a list of all the information in the essay and shows how the information is divided into paragraphs.

3. Write the main body first, then the conclusion and finally the introduction.

4. Check your work and ask someone to read it.

5. Revise the essay until it is mistake-free and easy to read.

Scientific Papers

Papers are either letters or full length articles. Two examples:

J. Tersoff and D. Hamman, Phys. Rev. Lett. **50**, 1998 (1983) - letter

P. Recher, J. Nilsson, G. Burkard and B. Trauzettel, Phys. Rev. B **79**, 085507 (2009) - article

Each paper is structured like an essay.
In addition it has an abstract.

If you can write a good essay, you can write a good paper.
But you also have to write the abstract.

Abstracts

The abstract is a summary of the most important results
Readers read the abstract to decide whether to read the paper.

The abstract must be focussed on the *results* and be easy to read.

Write an Abstract

Read the ‘paper’ and decide what the most important results are. Then write an abstract of the ‘paper’. 2 sentences maximum. When you have finished write your abstract on the whiteboard.

Measurement of the Young’s Modulus of steel with a dynamical method

The Young’s Modulus of a new steel alloy was measured with a dynamical method. A thin bar of the new steel was made and clamped at one end. The free end was made to vibrate with an electromagnet that was driven with an AC voltage. The AC frequency was varied and the amplitude of the vibration was measured to find the resonant frequency. The Euler-Bernoulli beam equation was used to relate the resonant frequency to the Young’s Modulus. This enabled the Young’s Modulus to be found from the resonant frequency, the mass of the beam and its dimensions. The Young’s Modulus was found to be 209 ± 5 GPa.

Abstract

The Young’s Modulus of a new steel alloy is measured with a dynamical method. The value found is 209 ± 5 Gpa.

Scientific Publishing – What do you think?

Why do we need scientific journals?
Why cannot we publish our own papers on our own web sites?

Human beings make mistakes.
Human beings are unreliable.
Human beings are dishonest.

But we all need reliable information.
Papers that appear in scientific journals are checked for accuracy before they are published. This helps to protect us from human failings.

Scientific Publishers – Who are they?

Scientific publishers organise the checking process and publish papers.

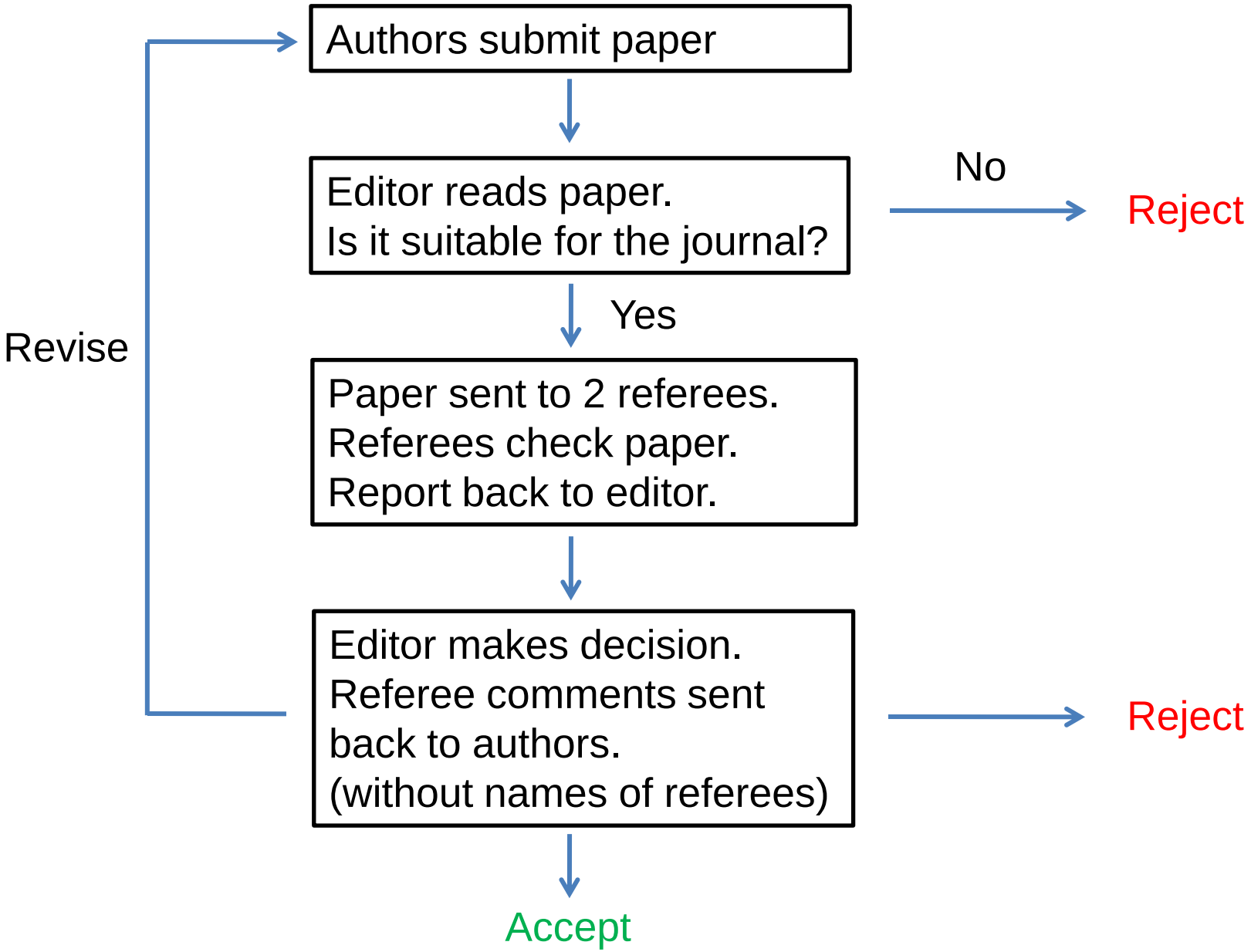
Two types of scientific publisher:

- Professional societies, eg Physical Society of Japan, UK Institute of Physics, American Physical Society. Publish papers in all areas of physics.

- Commercial publishers, eg Nature, Science, Elsevier. Publish papers in selected areas of physics.

The publication process is always the same.

The Scientific Publishing Process



The Role of the Editors

The editors want to publish high quality papers that are attractive to readers. Typical editors are PhD scientists.

When a paper is received:

1. One of the editors reads it. The paper may be rejected if it is unattractive or the scientific area is unsuitable.
2. The editor chooses the referees, sends the paper to referees and receives the referee reports.
3. The editor can accept or reject the paper or ask the authors to revise it.
4. The editor sends the referee reports to the authors and tells them the decision.
5. If revisions are needed, the authors have to make or refute the changes suggested by the referees.

The Role of the Referees

The referees advise the editors on the quality of the paper. Typical referees are active researchers with 10 or more years experience of publication.

The referees are free to comment on any part of the paper. But editors often put specific questions to the referees. Eg:
- Is the paper scientifically correct?
- Is the paper clearly written?
- Is the paper important?

Referees must base their criticism on reasons and evidence. The reports must be written in appropriate language. Personal attacks are not acceptable.

If the opinions of the first 2 referees differ, a third referee is consulted.

A Closer Look at What Referees Do

We will look at how referees evaluate papers.
The paper is an imaginary review paper about smartphone accelerometers.

The Paper

Accelerometers for Smartphones
A. N. Other and U. N. Known

Abstract Technology for smartphone accelerometers is reviewed.....

1 Introduction

The smartphone is a hand-held terminal device with many different functions. It can be used to access web sites, send email and make telephone calls. It also has a camera that can take still pictures and make movies. In addition most smartphones are equipped with a GPS receiver so that they can determine their location on the Earth's surface. Applications (Apps) can be downloaded to increase the smartphone's functionality.

One of the technical problems faced by smartphone designers is to determine the orientation of the phone relative to the surface of the Earth. This information is needed so that...

2 Main Body

States the requirements for smartphone accelerometers.
Explains how micromechanical cantilever accelerometers work.
Explains the advantages and disadvantages of this technology.
Discusses future developments.

3 Conclusion

The accelerometers used in most smartphones are micromechanical cantilever devices in which the cantilever forms the plate of a capacitor. These devices enable the smartphone to determine its own orientation and rotate the image it displays. However they suffer from a low sampling rate, typically 50 – 100 Hz. Development of a new generation of accelerometers with higher sampling rates will enable the smartphone to be used in new areas, for example sports science and geriatric medicine.

The Referee Report

Accelerometers for Smartphones by A. N. Other and U. N. Known

The authors review the current status of accelerometers for smartphones. The principles of the micromechanical cantilever accelerometer that is used in most smartphones are detailed and possible future developments of this technology are discussed. In my opinion, most of the manuscript is scientifically correct but some parts are not well written and it contains a few mistakes.

The authors should revise the following points:

Major points

- The introduction is a general introduction to smartphones. It should be replaced by an introduction that is focussed on smartphone accelerometers.

- Eq. (3) is incorrect because the dimensions of the left hand side (MLT^{-2}) are not the same as those of the right hand side (MLT^{-1}).

- In Fig. 2 it is difficult to distinguish the open and filled circles. The circles should be bigger.

- The following reference may be relevant: Sensors and Actuators A **84**, 149 (2000).

Minor points

- p. 5, col. 2. ‘the the’ -> ‘the’
- p. 9, col. 1. ‘is measured’ -> ‘are measured’

The paper may be published after the authors make these revisions.

Try Your Hand at Refereeing

Each group will write a ‘paper’, title of your own choice.
(150 words maximum, no abstract).
Then submit the paper to the editor (me).

The paper will be reviewed by two other groups. The referees will write a report in appropriate language and submit it to the editor.

Then the editor will send the reports to the authors.

How to Get Your Paper Published

The number of papers is increasing. So is the rejection rate. Physical Review B currently rejects about 50% of submissions.

"Correctness is not sufficient for publication." - PR editors

This is what you do to get your work published:

1. Get interesting, new results.
2. Before you write, read the instructions to authors. Submit what the editors want.
3. Write a paper that is clear and attractive to readers.
4. Remember your first readers will be a busy editor and busy referees. Get to the point so they understand what is new.

*If you have good results **and** you write a paper that readers want to read, your work **will** be published.*

Scientific Publishing: Summary

- Scientific journals provide us with information that is checked before publication so it is as reliable as possible.

- Editors select papers that are suitable for their journals.

- Referees check the correctness and importance of the selected papers.

- Editors decide whether to publish the papers.

- To publish in the best journals you have to get good results ***and*** write a paper that is attractive to editors, referees and all readers.

Oral Presentation – What do you think?

How does oral presentation differ from written presentation?

Oral presentation can be interactive – questions always form part of the presentation. Time limits the length of the presentation. The audience can only listen to it once.

Is it in any way similar to written presentation?

Oral presentation content must be suitable for the target audience. The speaker has to keep the audience interested. The structure is Introduction – Main Body – Conclusion.

Good and Bad Oral Presentation

We will watch the video ‘Academic Oral Presentation Skills’ from Flinders University. https://youtu.be/HRaPmO6TlaM

Watch the video again and make notes on :

What did the first speaker do wrong?
Is there anything the first speaker did right?
What did the second speaker do right?
Is there anything the second speaker did wrong?

Afterwards each group should compare and discuss their notes.

Good and Bad Oral Presentation: the first speaker

What did the first speaker do wrong?

Arrived late, ate while speaking, searched pockets, could not operate computer, was not confident, showed unattractive slides, gave no introduction, read notes, did not explain purpose of handout, did not look at audience, got facts wrong, presented information in illogical order, stood in front of projector, had mistakes on slides, did not explain slides, asked for audio-visual equipment during talk, answered phone, scratched face, talked for too long, ended talk with strange sound effects.

Is there anything the first speaker did right?

Yes, the speaker could be heard .

Good and Bad Oral Presentation: the second speaker

What did the second speaker do right?

Started with a good introduction, faced the audience, made eye contact with the audience, showed clear slides, was confident, was accurate, kept to time, could operate the audio-visual equipment, stated conclusions clearly.

Is there anything the second speaker did wrong?

Not much. But in scientific presentations we use fewer bullet points and avoid coloured backgrounds. And we do not normally use prompt cards or distribute handouts.

Scientific Oral Presentations

Conferences, meeting, lectures etc. are time limited.
A chair person enforces the time limit strictly.

You have to know how much you can say in the given time.

How many English words can you say in one minute?
How many slides can you present in 10 minutes?

About 110 ± 10 words, depends on speaker.
About 2 minutes per slide or 5 ± 1 slides in 10 minutes, depends on content.

Oral Presentation

Basic pattern: Introduction - Main Body – Conclusion

Specification of the oral presentation for this course:

Title: My Research
Target Audience: Graduate Students
Time Limit: talk, 3 mins; questions 2 mins (1 slide)

Note: a one slide talk is artificial but we cannot do longer presentations in this course.

Must gain attention of audience, keep their interest, presented in logical order with reasons and evidence.

How do we present to this specification?
First we write a plan.

Planning an Oral Presentation: step 1

1. Ask who am I speaking to?
2. Ask how much time do I have?
3. Ask how much information can the audience absorb?
   - People get tired.
   - You do not have time to tell them everything.
   - Choose the most important information. Make sure everyone understands what you say.
   - Experts can ask questions after the talk.
4. Think about how to keep the audience interested
5. Decide what goes in the main body.
6. Decide what the conclusion is.
7. Write notes on main body and conclusion.
8. Does main body contain all the evidence needed to support the conclusion? If not revise the content.
9. Decide what goes in the introduction.
10. Complete the plan.

Planning an Oral Presentation: step 2

We break the plan into slides.
A new slide is needed for each new idea.
It is helpful to sketch the slides.

Presentation Plan

Negative Electronic Refraction in Bilayer Graphene

One slide

Negative refraction in optics

Negative and positive refraction in bilayer graphene

Example wave function that shows negative refraction.

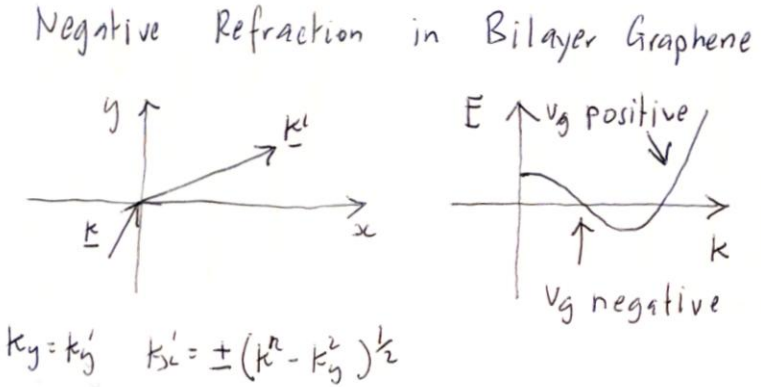


Image of wave function

Write Your Own Plan

Each group should write a plan for a one slide talk (3 mins).
Choose your own title.
After you have finished, write your plan on the whiteboard.

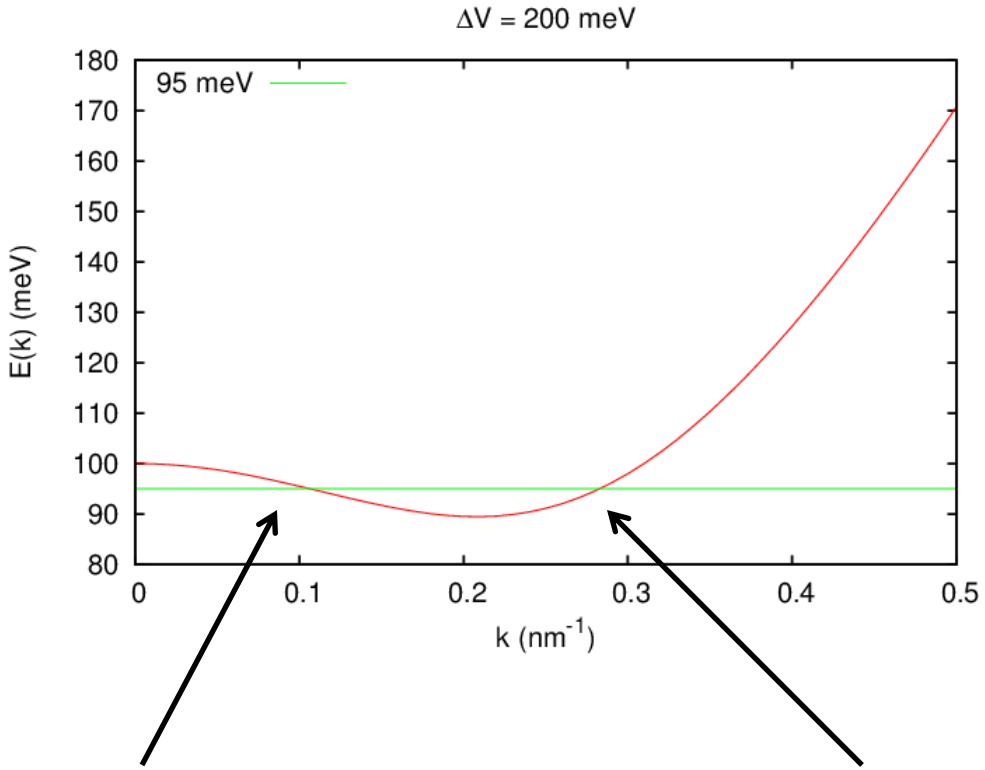
After we Have the Plan

We make the slides, prepare the words and practice the talk.

Preparing the Slides

- Lecture slides are designed to be read after the lecture. conference slides must be visual. Do not use lecture style for conference slides.
- Make sure your slides can be read from the back of the room.
- Do not put too much on each slide – you have to explain everything on the slide.
- Use variety to keep the audience interested. Do not have too many similar looking figures, equations, bullet points etc.

Birefringence in Bilayer Graphene



Two modes with different phase velocity ω / *k.*

Bilayer graphene is birefringent.

Like Calcite

Calcite

Negative group velocity

$\partial \omega / \partial k$.

Negative refraction.

Positive group velocity.

Positive refraction.

Preparing the Words

- Do not read, talk naturally.

- Practice timing. Talks that are too long or too short make a bad impression.

- A small amount of lighter material may help to prevent the audience getting tired, but do not make the talk too light.

- Ask someone to listen to your talk and comment on it.

Presenting the Talk

- Look at the audience, make eye contact.

- Speak to the back of the room.

- At the end of the talk say ‘Thank you’.

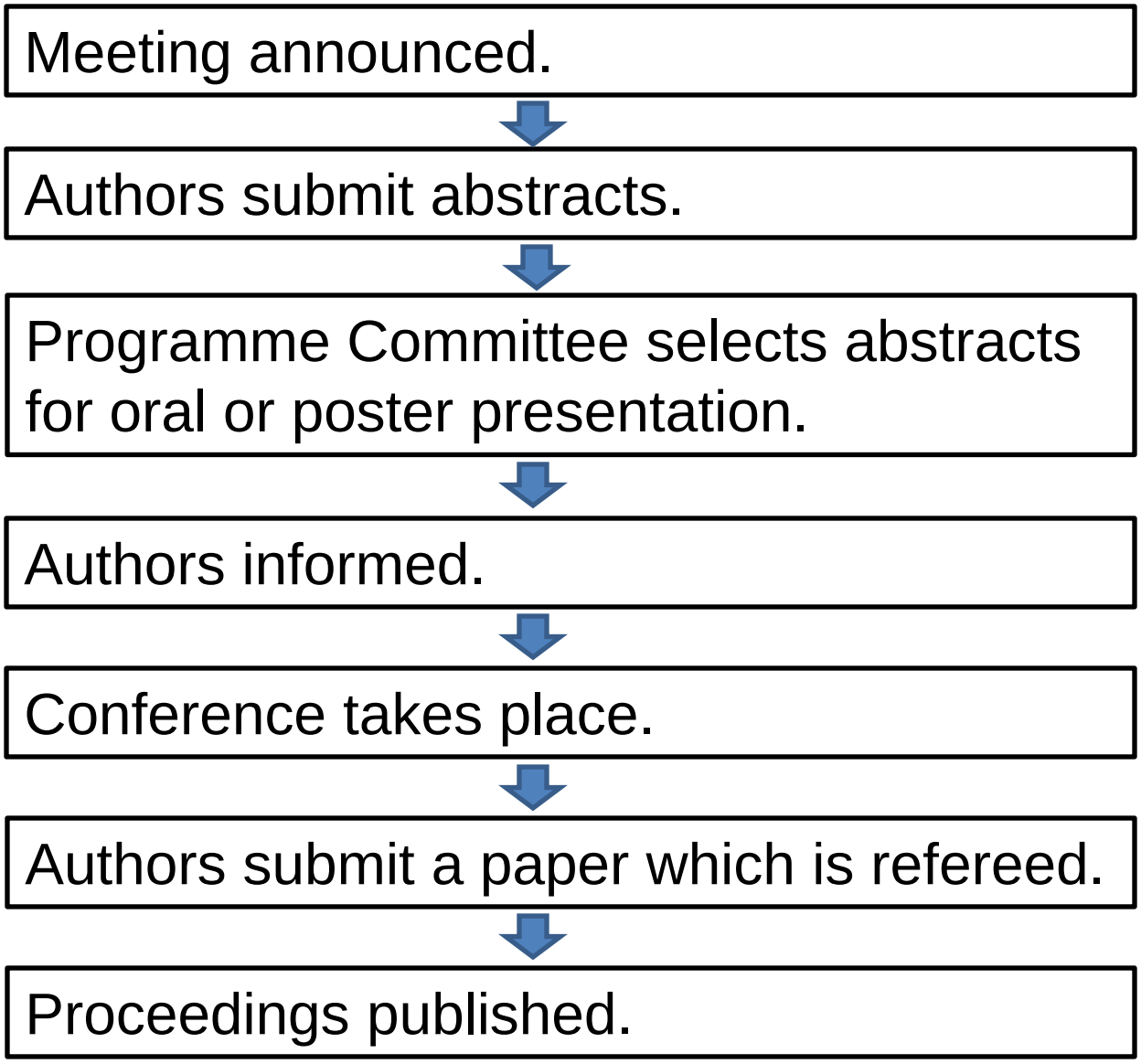
Answering Questions

- Respect all questions, even if they are strange.

- Answer the question that is asked.

- If you don’t know the answer, say you don’t know.

How Scientific Conferences are Organised



What Happens at a Conference?

Oral sessions:

- Under control of chair person.
- Chair calls speaker.
- Chair introduces speaker.
- Speaker presents talk, chair enforces time limit.
- Chair calls for questions.
- Chair selects questioners.

Poster sessions:

- Posters on display for a few hours.
- Presenters explain results to interested participants.
- Participants ask questions.

Preparing an Oral Presentation: Summary

1. Decide what the target audience is.
   Make sure the content is suitable for the target audience.

2. Write a plan.
   The plan is a list of all the information in the talk and shows how the information is divided into slides. Rough sketches of the slides may be helpful.

3. Prepare the slides and words.

4. Check that you can present the talk in the given time.
   Ask other people for comments.

5. Revise the talk and slides until your presentation is clear.

Course Summary

Doing science is about getting good results and communicating them well.

To communicate well:

- Understand the needs of the target audience.
- Keep them interested.
- Structure your communication: Introduction – Main Body - Conclusion.
- Plan before you write or speak – use the method taught in this course.
- Understand the scientific publishing process so you can write papers editors want to publish.

Good communication is good fun. Enjoy it!

Where to Get More Information

The Internet There are many web pages about English style but most are not useful for science. Try journal web pages and the wikipedia List of Style Guides.

YouTubeThere are many videos about oral presentation but most are not useful for science. Try the links on the Flinders University video page.

Books

Scientists Must Write, Robert Barrass, Routledge Study Guides ISBN 9780415269964 *An old book still full of good advice.*

Write in Style, Richard Palmer, Routledge Study Guides ISBN 9780415269964 *A book about good English, but not focussed on science.*