Devising a winning poster

Jane Moodie
Graduate Research Academic Support
You’ve been accepted for a poster presentation at a conference
What are the challenges?
Today we’ll examine how you can devise a prize-winning poster

1. What is a poster, and what are the features of a good one?

2. What are the principles of visual communication that you need to use?

3. How do you devise your own poster?

4. How do you present your poster?
What is a poster?

A poster facilitates quick visual comprehension of a piece of research

Hess *et al* (2009) state that a poster is

- like a visual abstract
- a highly condensed version of a research paper
- primarily visual displays of data with just enough supporting text to provide context, interpretation and conclusions
Key features of a good poster

Pedwell et al (2016) describe how a poster

• combines mostly visual with spoken and written elements

• must attract with artistic flair but also provide a strong scientific message

• must be easy for audience to read with clear visuals and design
You have to move from written communication...

Work integrated learning: allied health in rural and remote Australia

Allied health academic Narelle Campbell
Sr. Lecturer Anna M Smedts PhD

Context

The recent increases in allied health professional student numbers, coupled with workforce shortages and changes in service delivery models, has contributed to a national shortage of work-integrated learning (WIL) placements. To address this issue, there is a critical need for improved models of training that meet educational and healthcare requirements and also value back to local communities and the healthcare workforce. The Northern Territory (NT) only offers university students in pharmacy and social work, as other allied health professional students undertaking placements in the NT are from interstate universities. This adds an additional layer of complexity to NT allied health placements.

The nature of the current allied health (AH) workforce in the NT is poorly defined, as is the training and efficiency of those student training models. This study, which contributes to the national Rural Allied Health Workforce Study (RAHW), will provide valuable data to inform health workforce policy and training program reform.

Objectives

The objective of our study was to profile the current allied health (AH) workforce in the Northern Territory and compare the various existing models of AH work-integrated learning (WIL) placements. We collected data about students’ perspectives as well as health professional experiences.

The outcomes of our study were:
- describe the attitudes and experiences of AH professionals in respect to WIL placements in the Northern Territory;
- define factors that support and challenge the capacity for and provision of student training in the work environment;
- contribute to a national picture of the AH professional workforce;
- and will be used to inform policy that aligns student and workforce needs and expectations.

Methods

Allied Health Professional Data Collection

Electronic and paper-based surveys were distributed to allied health professionals in the Northern Territory over a three-time period (2018 – 2020). Data collected in the government sector was undertaken in partnership with the Department of Health and Families. The private and non-government sector participated also to provide a comprehensive profile of the allied health workforce in the NT.

Focus groups with health professionals across the Territory are being used to triangulate and confirm the survey data.

Student Data Collection

Pre and post-placement web-based surveys were distributed to student allied health professionals undertaking WIL placements in the NT. Ethics approval was granted through the Menzies School of Health Research, NHMRC ODT.

Results

- "Cultural experience. The placement was an eye opener"
- "Being able to travel to remote communities and learn outside the square"
- "Both of us having access to a university context"
- "The culture in the team influences the way placements are perceived"
- "How to work independently, as expected when qualified, how to manage my own caseload and also how to work in collaboration with other health professionals."
- "The student's growing confidence is a nice thing to watch"

Discussion

Our research has not been able to quantify NT workforce recruitment as an outcome of NT student placements, however, focus group participants cited examples of success. Additionally, the student data supported this proposition with students reporting increased interest in working in the NT as a result of placements. Universities need to work more closely with their supervising workforce to ensure quality of teaching and supervisor understanding of curriculum (assessment). This could be achieved by local training.

Conclusion

The Northern Territory Clinical School has undertaken the first comprehensive study in the Northern Territory to characterize its AH workforce. As the AHWIL setting and identify factors that impact capacity and willingness to support student training. The outcomes of this study will provide an evidence base for the development of more efficient and effective AHWIL placement models.

Contact

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... to visual communication

Should females prefer males with elaborate nests?

Bob E.M. Wong & Topi K. Lehtonen. School of Biological Sciences, Monash University, Australia

Males often build nests, not only for rearing offspring, but also for attracting mates.

We set out to investigate whether females should use nest appearance to assess male quality in a fish, the sand goby.

Male sand gobies build nests by piling sand on top of shells or rocks.

When nest quality was experimentally disentangled from other male traits, we found that female sand gobies did not prefer males with the most elaborate nests. Moreover, nest quality was an unreliable signal of male condition and, hence, male parental quality.

Behav Ecol. 2009. 20: 1015-1019

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What do we mean by visual communication on Engineering posters?

Examine the following poster and analyse how it communicates messages visually
Unlocking the Secrets of Turbulence: Instabilities in Flows Over Bluff Plates

Hemant K. Chaurasia*1 and Professor Mark C. Thompson1

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The Problem
- To design fuel-efficient and high-performance technologies, engineers need to accurately predict turbulent flow - e.g. aerodynamic drag forces on cars, aircraft and Space Shuttles.
- For such designs, computational fluid dynamics (CFD) software is widely used by industry to predict fluid flow.
- Due to a limited understanding of turbulence, present-day CFD produces typical errors of ~5%, placing hard limits on achievable design efficiency.

Project Goals
- Simulate the transition to turbulence for flow over a flat-faced rectangular plate
- Characterise the underlying "instability modes" governing the onset of this transition
- This knowledge may then be applied to devise CFD models which predict turbulent flow more accurately

Method
- In-house direct numerical simulation CFD code ("SE2D")
- Spectral element method to simulate the flow.
- Floquet stability analysis techniques to examine flow transitions
- Results verified by independent 2D and 3D simulations
- Faculty of Engineering Beowulf Computer Cluster: converts 100 PCs in student computer labs into a powerful supercomputer after hours

Key Findings
- Identified two instability modes with wavelengths ~1H and 4.5H (dominant).
- Dominant mode shows characteristics of the "elliptical instability": a well-known theoretical mechanism for fluid instability.
- These same characteristics are seen in cylinder and bluff body wake flows.
- This suggests that the elliptical instability mechanism may play an important role in the process of turbulent transition itself, independent of flow geometry.
- Such knowledge may enable CFD models that better predict turbulent flow.
Elements of visual communication in

*Unlocking the Secrets of Turbulence*

- catchy title with clear message
- eye-catching colours and images
- clear division of space: top third given to Problem, Project Aims, Method and bottom two thirds given to Key Results
- good flow from background to important results and outcomes
- not many words: no long sentences, just points and phrases
- visual not written Results: yellow speech bubbles highlighting key findings and no figure numbers or titles
- font size and bold used to emphasise important information
Some key poster design principles

From communication theory, the fundamentals of rhetoric and multi-media research, these principles apply:

1. Coherence: careful selection of content

2. Signaling: clear direction of audience’s attention to messages in title, headings, figure titles, use of colour, choice of font sizes and amount of space given to different poster parts

3. Contiguity: relevant text should be close to the graphics of interest
In summary, the key elements of successful posters are

• powerful visual communication

• eye-catching impact

• clear simple message

• mostly graphics and only essential text
Devising your own poster
What are typical requirements for posters?

Example conference instructions:

1. describe work under one of the identified conference themes
2. posters should be 84cm wide and 119cm high
3. posters should include a title, authors’ names, institutions, and contact details
4. posters should be succinct, easily read from a distance, and engaging

Australasian Research Management Society Conference
Tips for selecting your poster content

Focus on one aspect of your research, not your whole PhD project

• identify the key outcome of this study

• completely transform any written information - *do not cut and paste sections of writing!*

• think in blocks of information – *Background, Results = heart of my poster, Outcomes*

• draft your poster using these blocks - *play around with different possibilities*
Focus on one simple message

Should females prefer males with elaborate nests?

Bob E.M. Wong & Topi K. Lehtonen. School of Biological Sciences, Monash University, Australia

Males often build nests, not only for rearing offspring, but also for attracting mates.
We set out to investigate whether females should use nest appearance to assess male quality in a fish, the sand goby.

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Behav Ecol. 2009. 20: 1015-1019

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Focus on your key outcomes

Major findings

+ supporting evidence

+ brief context

Don’t waste time on background
Get your message into your title

Should females prefer males with elaborate nests?

• Communicate the main outcome

• Keep it short

• Try to attract the audience to your poster

• Consider using a sentence rather than a phrase (Pedwell et al, 2016)
Journal paper title versus poster title

From formal journal paper title:
Accurate predictions of elliptical instabilities in bluff body wake flows using computational fluid dynamics

to more conversational poster title:
Unlocking the secrets of turbulence: instabilities in flows over bluff plates
Unlocking the secrets of turbulence: instabilities in flows over bluff plates

The Problem

Project Goals

Method

Key Findings
Four key elements in poster design

1. **layout** that matches your content, with clear reader pathway

2. good **colour scheme and background design**

3. informative **graphics, images and figures**

4. concise formatted **text**
Poster element 1. What is the best layout?

- portrait versus landscape?
- columns versus rows?
- boxes versus free form?
L-to-R flow in vertical columns

Title & Authors

Flows top to bottom, left to right
(Source: Cain Project website)
The Relationship Between Electrovestibulography and Parkinson’s Disease Severity
Mehmaz Shoushtarian  Supervisor: Brian Lithgow
Diagnostic and Neurosignal Processing Research Group, Centre for Biomedical Engineering

Introduction
Parkinson’s disease (PD) is the second largest neurodegenerative disorder worldwide.
PD is known to be caused by the progressive death of selected populations of dopamine producing neurons in parts of the basal ganglia of the brain (Fig. 1).

Background Physiology
The dopaminergic system of the basal ganglia is involved in the integration of sensory information such as vestibular and visual, which are relevant for balance [1].
The vestibular system is the sensory system which detects head movement and position in order to keep our balance.

Methods

Recordings
• Electrovestibulography (E VestG): A non-invasive technique used to record neural activity from the vestibular apparatus and nuclei.
• Vestibular driven response to a head tilt induced using a hydraulic tilt chair (Fig. 2), was recorded using an electrode placed in the ear canal [2].

Results
• ‘Tap’ measurements versus scores from Webster’s Mobility Test.

Figure 4
$R^2 = 0.5991$
$p < 0.001$

• Stimulus: sideways tilt of chair
  upright → ipsilateral tilt → upright

• Time segment of recording: first 2 seconds following movement of chair back to upright position.

Conclusion
An objective measure of the severity and progression of Parkinson’s disease would be of great benefit to both patients and neurologists. The results from this study indicate that the Tap biomarker is correlated with the severity of the disease, with larger measurements showing a more progressed stage of the disease.
The waveforms generated using the NEER on E VestG recordings are being studied for other potential biomarkers which could help develop a more sensitive and quantitative measure of disease progression.

Objectives
We hypothesized that biomarkers obtained from vestibular recordings could be related to scores from Parkinson’s mobility tests which indicate disease progression and mobility impairment.

Participants
• 15 Parkinson’s patients, diagnosed by a neurologist, took part in the study.
• The degree of mobility impairment was assessed by the Modified Webster’s Mobility Test.

Analysis
• A wavelet-based Neural Event Extraction Routine (NEER) used to detect and average neural events from recorded E VestG signals.
• An SP/IA (summarization potential to action potential ratio) plot of averaged neural events detected was generated using the NEER.
• A ‘Tap’ biomarker (time of action potential) shown in Fig. 3 was measured from the plot.

References
L-to-R flow in rows

Title & Authors

Part 1

Part 2

Part 3

(Source: Cain Project website)
Towards an Asthma Vaccine: Scalable Process for the Purification of a Latex Allergen Protein

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The Problem
- To create an asthma vaccine, researchers need large amounts of pure, biologically active Hev b 6 protein.
- The protein Hev b 6 has been found to account for 70 – 86% of healthcare workers affected by latex allergies².
- 80% of occupational asthma in the healthcare industry is caused by latex allergies¹.

Project Goals
- Devise a protocol to produce biologically active Hev b 6 – that is, a protein that has been refolded into its normal, three-dimensional state.
- Produce high purity & concentrated protein for use in pre-clinical studies at the CRC for Asthma.

What is Recombinant Protein?
...means that recombinant DNA technology has been used to optimise the production of the protein – in this case the gene for Hev b 6 is expressed using the cellular mechanism of bacterial cells³.

What are Inclusion bodies?
...dense aggregates of insoluble mis-folded proteins formed when proteins are over expressed in a cell.

Method:
- **Fermentation:**
  - Protein was over expressed in E. Coli using a fed batch fermentor.

- **Sonication:**
  - Cells were lysed via ultrasound and high pressure homogenisation used to release inclusion bodies from E.coli.

- **Centrifugation:**
  - For removal of cell debris, some contaminants and large particles.

- **Chromatography:**
  - Target protein was isolated and refolded using histag absorbent (Ni-NTA Agarose gel) and for contaminant removal.

Results – Example Chromatograph

Conclusions

Successful purification of soluble Hev b 6.

On-column refolding strategies developed for Hev b 6.

High pressure homogenisation shown to be a feasible method to increase yields by removing centrifugation stage and enhancing Hev b 6 solubility.
Centered image & explanations

Title & Authors

Abstract

(Source: Cain Project website)
The Monash 3D Multimedia Sensor Node was designed by our final year students to create an experimental platform for developing innovative algorithms for distributed, collaborative vision processing over mobile platforms. Potential applications include swarm robotics and smart camera networks with autonomous surveillance capabilities.

**Details**

**XBOX360 Kinect**
- Motion sensing input device created by Microsoft for the XBOX360 game console.
- The onboard depth sensors, as well as the RGB camera provide the robot with a real time 3D view of its surrounding environment.

**BeagleBoard-xM**
- Low power, low cost single board open-source computer measuring a tiny 3.25" x 3.25".
- Powered by a 1GHz ARM® Cortex microprocessor with 1GB DDR RAM, making it ideal for complex computational tasks such as processing depth information captured by the Kinect.

**Credits**

Design: Nick D’Ademo, Alexandre Proust
Supervisors: Dr. Ahmet Sekercioglu, Dr. Wai Ho Li
Two fields in contrast

Title & Authors

(Source: Cain Project website)
Instability and transition of steady and pulsatile flow in a stenotic tube

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Steady inflow: jet flapping and turbulence
At low Reynolds numbers, a steady axisymmetric jet emanates from the separation line just downstream of the stenosis throat. In the geometry we have studied, a smooth 60% radial stenosis (contraction), the symmetric state has a linear instability at $Re=722$. The instability acts to deflect the jet from the centreline of the tube.

The sequence of images below, generated from DNS at $Re=750$, illustrates a long-timescale flapping of the jet which is quasi-repetitive. The blue isosurface is of the azimuthal vorticity component, and the red/yellow isosurfaces are of positive/negative axial vorticity component. After the jet achieves maximum deflection, there is a burst of turbulence that washes downstream as axisymmetry makes a partial recovery, allowing the cycle to start again.

Pulsatile inflow: alternate tilting of vortex rings
In pulsatile flow, the dominant flow features are vortex rings associated with pulsing, and shear layers that trail behind them when the pulse period lengthens. The vortex rings have at least two kinds of absolute global instability, while the shear layers can be susceptible to convective instability.

Alternate tilting of successively generated vortex rings is one kind of absolute instability. The pair of images below, obtained one pulse period apart when the flow has reached its asymptotic turbulent state for $Re=500$, dimensionless pulse period 2.5, Womersley number=15.85, illustrate the alternating tilting of vortex rings (blue, drawn as an isosurface of the discriminant of the velocity gradient tensor), and their rapid and energetic breakdown shortly downstream (emphasised by red/yellow isosurfaces of axial vorticity component).

Pulsatile inflow: wavy instability of vortex rings
Wavy vortex-core instability is another kind of absolute instability, which tends to occur at shorter pulse periods. As can be seen to right, the instabilities appear related to Wondrak instability of isolated vortex rings, although here they appear at lower azimuthal wavenumber, $k=3$ or $4$.

The three- or four-fold symmetry of the instability remains dominant in the turbulent asymptotic states that are obtained at Reynolds numbers near transition. As is the case for the vortex-tilting instability, there is a localised turbulent breakdown that evolves slowly upstream to lie close to the stenosis. The two frames below illustrate a stage in the evolution, and the asymptotic state.

Make the reader pathway clear

Consider

• numbering each section
  1. The Problem
  2. Research Aims
  3. .......

• using curved text boxes

• using white space effectively
Poster element 2. Choose a good colour scheme and simple background design

- make your poster attractive and easy to read
- use colours to create connections
- use background colour and images with care

Always ask yourself:
Does it help me communicate my message?
Choice of colour in a poster

Which combinations can you read??

Red on Blue is blurry to the eye

Easy to read

Yellow is difficult to read

Easy to read

Blue on Red is blurry to the eye

Easy to read

Source: Patti, T. *Poster Presentations at a Conference*, Monash University
Poster element 3. What are effective graphics and figures?

Use graphics that are easy to read and understand:

- images that capture an idea – *eg: a flow chart to demonstrate the steps in your future work*

- colours with meaning – *eg coding to highlight connections; RED for startling information*

- section sizes to signify importance of the information – *make Results section the biggest!*

- arrows to show logical connections
For figures on posters

- Use graphs not tables
- Make figures large and easy to read from 1 metre
- Use the same font size for legends and axes as for poster text

Your graphs should tell the whole story! (Zielinska 2011)

Think of the audience reading your poster, and suggest improvements to the graph on the next slide:
Sample draft slide is difficult to read

Source: Hess et al 2006
Final slide is much clearer

Lynx-Hare Population Oscillations
(represented by trapping data)

Source: Hess et al 2006
Why the final slide is easier to read

1. White background for the graph
2. Units on the axes clearer
3. Axis description horizontal for easy reading
4. Colour of the graph lines stronger
5. Legend placed on the graph lines

Additional improvement to clarify the graph message:
Replace the figure title with a sentence heading above that concisely states the key finding
Change your results into visual information

1. Transform the figures from your written paper – *see good advice in Purrington (2015)*

2. State the key result as figure title and give clear evidence in the graph

3. Use axis labels the same size as body text

4. Highlight the most critical information:

   - Interesting result here
   - Look at this??

5. Locate your figures next to the relevant text
Poster element 4. Make the writing easy to read and understand

- Use phrases not sentences
- Use bullet points, lists and flow charts
- Use short blocks (max 50 words), in short lines, in short sentences
Results
The pipe itself has shown strains that vary following a daily cycle. It has also been seen that the average strain also varies over a longer time scale.

Results
Pipe strains
• follow a daily cycle
• vary over time
Format your text carefully

- Left-justify text in curved boxes (Zielinska 2011) – EASIER TO READ
- Use a sans serif font - eg Calibri is clean and professional – EASIER TO READ
- Go from very large title TO large headings TO text minimum 24 pt – EASIER TO READ
Format your text carefully

• Use **bold** or *italic* formatting in same font

• **Do not** underline

  *It makes the words harder to read*

• **Do not** use shadow formatting

  *It makes the words harder to read*

• **Do not** use all capital letters

  **IT MAKES THE WORDS HARDER TO READ**

• **Do not** use capital letters in figure titles

  It Makes the Words Harder to Read
In this part of today’s seminar, we’ve discussed how you can

1. devise a great poster
2. communicate your key messages visually
3. win fame and glory for your poster and for your research
So finally... you’ve devised a wonderful poster. Now, what are you going to say?
Hess et al’s advice on presenting your poster

• Use your poster as a visual aid - don't read it!

• Prepare 0.5-, 2-, and 5- minute tours of your poster focusing on the main message of your poster – *My work shows that* …..

• Provide an extended abstract of your study
  1. What is your problem? and why it is important? (Introduction)
  2. What was your aim? and what did you do? (Aim & Methods)
  3. What did you discover? (Results) and
  4. What does the answer mean? (Discussion)

In summary, this seminar has provided lots of advice on how you can devise a prize-winning poster at your next conference.

Good luck!
Further resources for poster presentations

Online resources for devising posters

http://www.ncsu.edu/project/posters


M Alley Design of Scientific Posters Penn State University, USA
http://writing.engr.psu.edu/posters.html


C Purrington (2015) Designing conference posters
http://colinpurrington.com/tips/poster-design

Excellent books for designing presentations


Interesting articles on visual communication principles:
