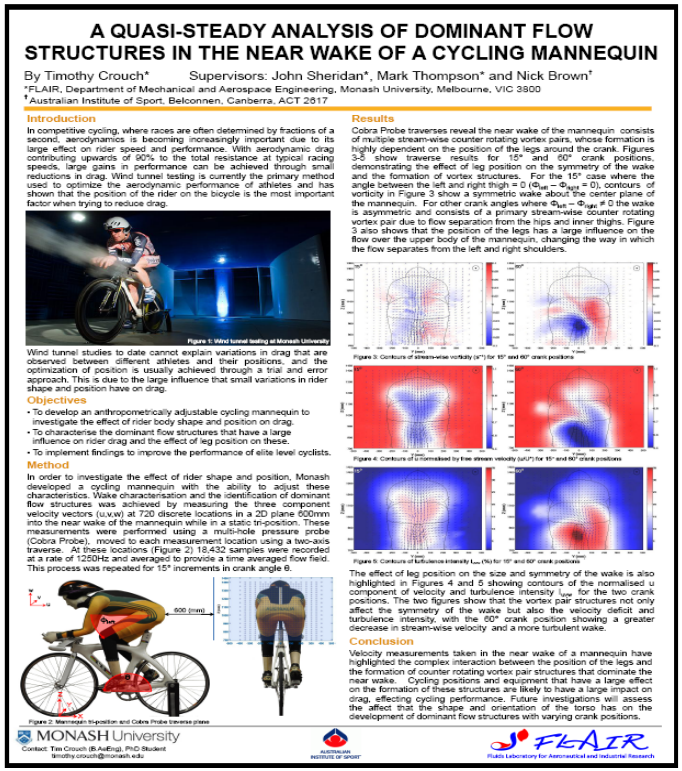
Devising a winning poster



A QUASI-STEADY ANALYSIS OF DOMINANT FLOW STRUCTURES IN THE NEAR WAKE OF A CYCLING MANNEQUIN

By Timothy Crouch* Supervisors: John Sheridan*, Mark Thompson* and Nick Brown†

*FLAIR, Department of Mechanical and Aerospace Engineering, Monash University, Melbourne, VIC 3800

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Introduction

In competitive cycling, where races are often determined by fractions of a second, aerodynamics is becoming increasingly important due to its large effect on rider speed and performance. With aerodynamic drag contributing upwards of 90% to the total resistance at typical racing speeds, large gains in performance can be achieved through small reductions in drag. Wind tunnel testing is currently the primary method used to optimize the aerodynamic performance of athletes and has shown that the position of the rider on the bicycle is the most important factor when trying to reduce drag.

Wind tunnel studies to date cannot explain variations in drag that are observed between different athletes and their positions, and the optimization of position is usually achieved through a trial and error approach. This is due to the large influence that small variations in rider shape and position have on drag.

Objectives

- To develop an anthropometrically adjustable cycling mannequin to investigate the effect of rider body shape and position on drag.
- To characterise the dominant flow structures that have a large influence on rider drag and the effect of leg position on these.
- To implement findings to improve the performance of elite level cyclists.

Method

In order to investigate the effect of rider shape and position, Monash developed a cycling mannequin with the ability to adjust these characteristics. Wake characterisation and the identification of dominant flow structures was achieved by measuring the three component velocity vectors (u,v,w) at 720 discrete locations in a 2D plane 600mm into the near wake of the mannequin while in a static tri-position. These measurements were performed using a multi-hole pressure probe (Cobra Probe), moved to each measurement location using a two-axis traverse. At these locations (Figure 2) 18,432 samples were recorded at a rate of 1250Hz and averaged to provide a time averaged flow field. This process was repeated for 15° increments in crank angle θ.

Results

Cobra Probe traverses reveal the near wake of the mannequin consists of multiple stream-wise counter rotating vortex pairs, whose formation is highly dependent on the position of the legs around the crank. Figures 3-5 show traverse results for 15° and 60° crank positions, demonstrating the effect of leg position on the symmetry of the wake and the formation of vortex structures. For the 15° case where the angle between the left and right thigh = 0 ($\Phi_{left} - \Phi_{right} = 0$), contours of vorticity in Figure 3 show a symmetric wake about the center plane of the mannequin. For other crank angles where $\Phi_{left} - \Phi_{right} \neq 0$ the wake is asymmetric and consists of a primary stream-wise counter rotating vortex pair due to flow separation from the hips and inner thighs. Figure 3 also shows that the position of the legs has a large influence on the flow over the upper body of the mannequin, changing the way in which the flow separates from the left and right shoulders.

The effect of leg position on the size and symmetry of the wake is also highlighted in Figures 4 and 5 showing contours of the normalised u component of velocity and turbulence intensity I_{UVW} for the two crank positions. The two figures show that the vortex pair structures not only affect the symmetry of the wake but also the velocity deficit and turbulence intensity, with the 60° crank position showing a greater decrease in stream-wise velocity and a more turbulent wake.

Conclusion

Velocity measurements taken in the near wake of a mannequin have highlighted the complex interaction between the position of the legs and the formation of counter rotating vortex pair structures that dominate the near wake. Cycling positions and equipment that have a large effect on the formation of these structures are likely to have a large impact on drag, effecting cycling performance. Future investigations will assess the affect that the shape and orientation of the torso has on the development of dominant flow structures with varying crank positions.

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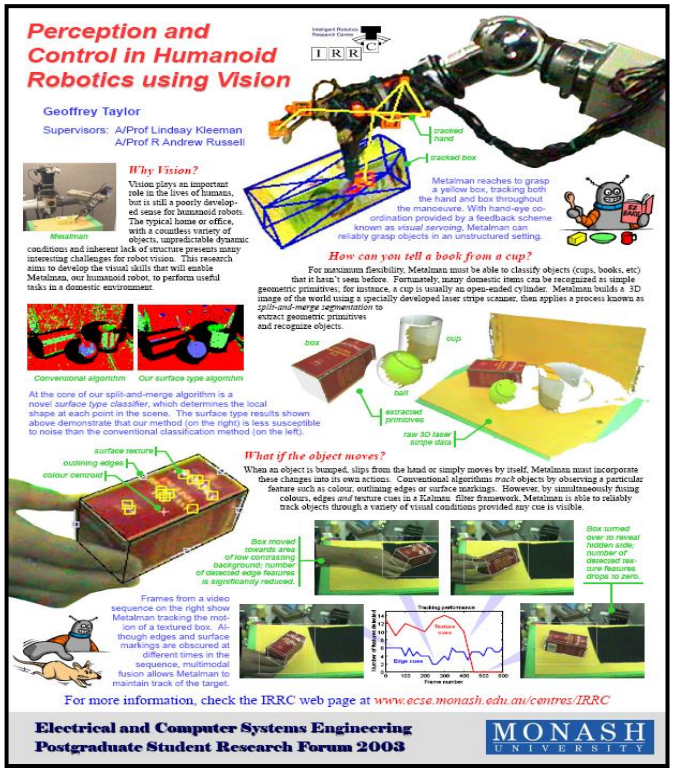

Perception and Control in Humanoid Robotics using Vision

Geoffrey Taylor

Supervisors: A/Prof Lindsay Kleeman

A/Prof R Andrew Russell

IRRC

Intelligent Robotics Research Centre

tracked hand

tracked box

Why Vision?

Vision plays an important role in the lives of humans, but is still a poorly developed sense for humanoid robots. The typical home or office, with a countless variety of objects, unpredictable dynamic conditions and inherent lack of structure presents many interesting challenges for robot vision. This research aims to develop the visual skills that will enable Metalman, our humanoid robot, to perform useful tasks in a domestic environment.

Metalman

Metalman reaches to grasp a yellow box, tracking both the hand and box throughout the manoeuvre. With hand-eye co-ordination provided by a feedback scheme known as *visual servoing*, Metalman can reliably grasp objects in an unstructured setting.

How can you tell a book from a cup?

For maximum flexibility, Metalman must be able to classify objects (cups, books, etc) that it hasn't seen before. Fortunately, many domestic items can be recognized as simple geometric primitives; for instance, a cup is usually an open-ended cylinder. Metalman builds a 3D image of the world using a specially developed laser stripe scanner, then applies a process known as *split-and-merge segmentation* to extract geometric primitives and recognize objects.

Conventional algorithm

Our surface type algorithm

box

cup

ball

extracted primitives

raw 3D laser stripe data

At the core of our split-and-merge algorithm is a novel *surface type classifier*, which determines the local shape at each point in the scene. The surface type results shown above demonstrate that our method (on the right) is less susceptible to noise than the conventional classification method (on the left).

What if the object moves?

When an object is bumped, slips from the hand or simply moves by itself, Metalman must incorporate these changes into its own actions. Conventional algorithms *track* objects by observing a particular feature such as colour, outlining edges or surface markings. However, by simultaneously fusing colours, edges *and* texture cues in a Kalman filter framework, Metalman is able to reliably track objects through a variety of visual conditions provided any cue is visible.

surface texture

outlining edges

colour centroid

Box moved towards area of low contrasting background; number of detected edge features is significantly reduced.

Box turned over to reveal hidden side; number of detected texture features drops to zero.

Frames from a video sequence on the right show Metalman tracking the motion of a textured box. Although edges and surface markings are obscured at different times in the sequence, multimodal fusion allows Metalman to maintain track of the target.

Tracking performance

Texture cues

Edge cues

Frame number

For more information, check the IRRC web page at www.ecse.monash.edu.au/centres/IRRC

Electrical and Computer Systems Engineering Postgraduate Student Research Forum 2003

MONASH UNIVERSITY

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

Flinders University

JCU Northern Territory Clinical School & NT Rural Clinical School

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 health systems' requirements and add value back to local communities and the healthcare workforce. The Northern Territory (NT) only offers university courses in pharmacy and social work; all 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 capacity and efficacy of local student training models. This study, which also contributes to the national Rural Allied Health Workforce Study (RAHWS), 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 student perspectives as well as health professionals' experiences.

The outcomes of our study:

- describe the attitudes and experiences of AH professionals in regard 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 4mo time period (Dec 08 - Mar 09). Data collection in the government sector was undertaken in partnership with the Department of Health and Families. The private and nongovernment sectors participated also to provide a comprehensive profile of the allied health workforce in the NT

Focus groups with self-nominated allied 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 (n=57).

Ethics approval was granted through the Menzies School of Health Research HREC 07/67

RESULTS

ALLIED HEALTH PROFESSIONALS

Over 200 responses were received representing a 37% return rate.

NT WORKFORCE DEMOGRAPHIC PROFILE

1:4 male:female ratio
Average age 40.2yrs (compared NGW average age 43yrs)
75% of respondents were in public employment
6% gained their qualification in the NT
50% undertook rural or remote placements during their training
25% reported ≤ 5yrs work experience

CHURN RATE

60% of those supervising students reported a likelihood of leaving the NT within 2-5yrs. Younger respondents and those having spent less time in the NT, were more likely to report an intention to leave within 2 years, irrespective of job satisfaction. Nearly 80% reported themselves as satisfied or extremely satisfied with their current job.

STUDENT SUPERVISION

62% reported supervising students. Of these, 40% reported that they would have liked more student supervision responsibilities and only 9% reported student overload. Two factors were cited as the most important facilitators of successful student placements: Organisation and the university.

Workload and time pressures were cited as the biggest barriers to student placements. Early indications from focus groups is that workforce recruitment is a key motivator, as is the intrinsic reward of contributing to the profession through education. The majority of supervisors had not been trained in supervision processes.

Chart 1: Health professional responses by profession

"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 contact"

"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."

ALLIED HEALTH STUDENTS

Most (93%) students rated their placements as 'excellent' or 'good' and appreciated both the clinical and cultural opportunities offered by a NT placement.

75% of students who rated their placement positively also indicated that their interest in working in the NT had increased.

Students rated professional competencies closely followed by competencies to work with indigenous clients as the most important thing they expected learn from the placement.

Given the high interest in indigenous health service delivery, it was interesting that prior to placement only 20% of students reported having undertaken any formal cultural training. After placement students reported that personal experience had been the most powerful learning strategy for them.

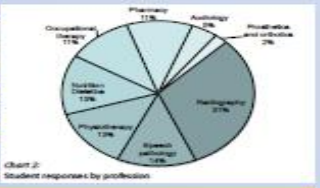

Chart 2: Student responses by profession

DISCUSSION

These results demonstrate a high level of satisfaction from allied health students with NT work-integrated learning placements. Commitment to teaching by AHPs is demonstrated by their desire to increase the amount of students they supervise. The student's university and the receiving organisation are seen to have a key role in enhancing placement success. Both of these entities need to implement strategies to reduce the barriers related to student placements.

Currently, student placements are organised in most professions as an outcome of individual relationships between workplaces and the universities. This results in a less efficient, fragmented approach to the placement that is reliant on individuals. In light of the high churn rate of AHPs measured in our study, universities should aim to develop robust, longitudinal relationships with organisations at high levels of governance. Placements need to be viewed as core business through all levels of management. The NT should partner with universities who demonstrate long term commitment to the provision of effective health care in the NT to ensure a stable supply of high quality placements and work-ready graduate allied health professionals.

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 placement. 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 characterise its AH workforce, define the AHWIL setting, and identify the 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.

"the student's growing confidence is a nice thing to watch"

CONTACT

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Ph 08 8922 7666
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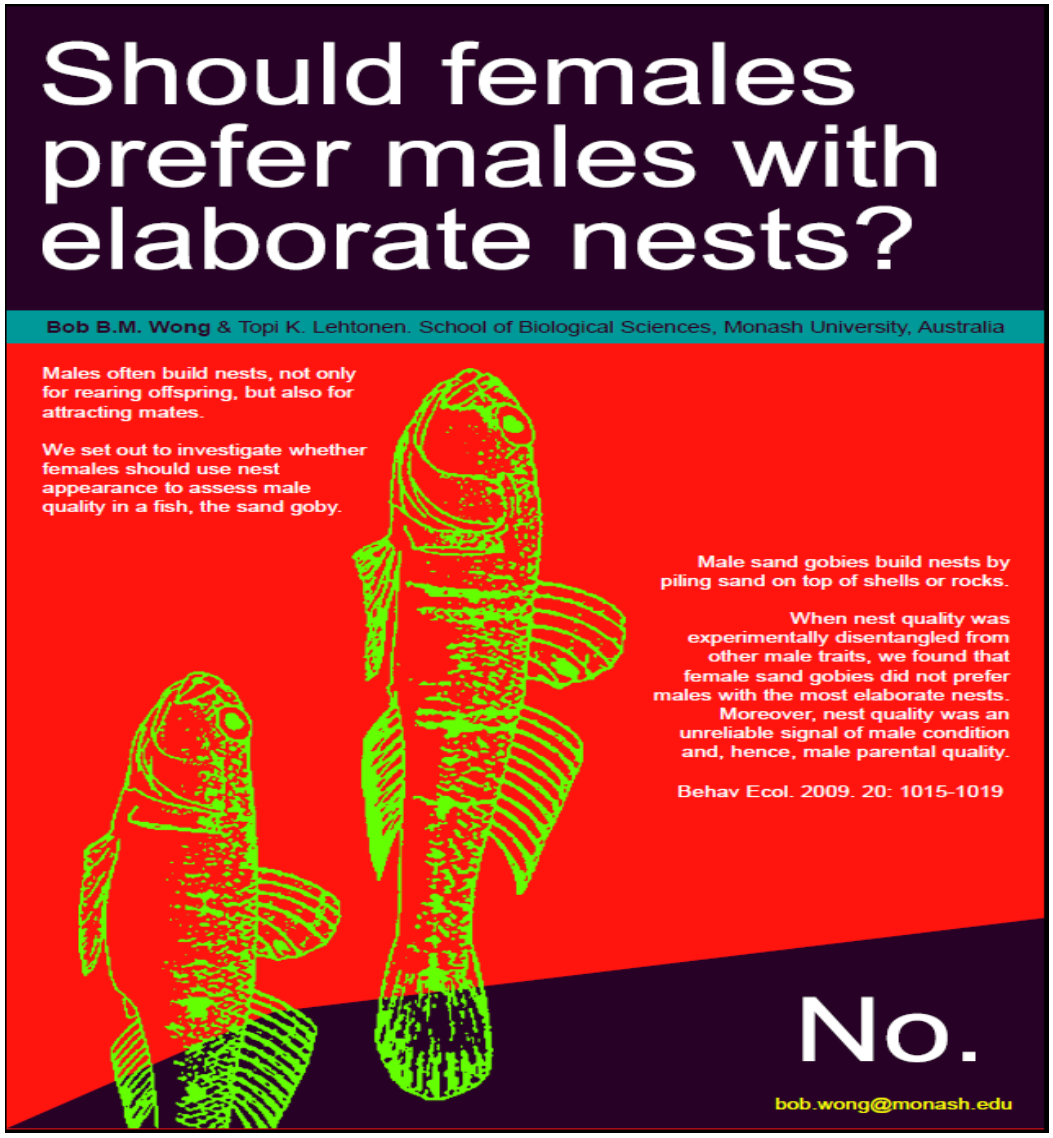
… to visual communication



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. Thompson[1]

[1]Fluids Laboratory for Aeronautical and Industrial Research, Department of Mechanical and Aerospace Engineering, Monash University

*Corresponding author: hemant.chaurasia@gmail.com

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

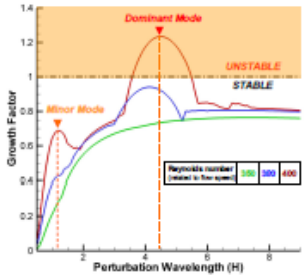
Simulate the transition to turbulence for flow over a flat-faced rectangular plate

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

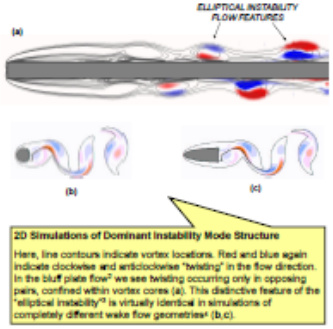
Method

- In-house direct numerical simulation CFD code ("SE2D")
- Spectral element method to simulate the flow; Floquet stability analysis technique[1] 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



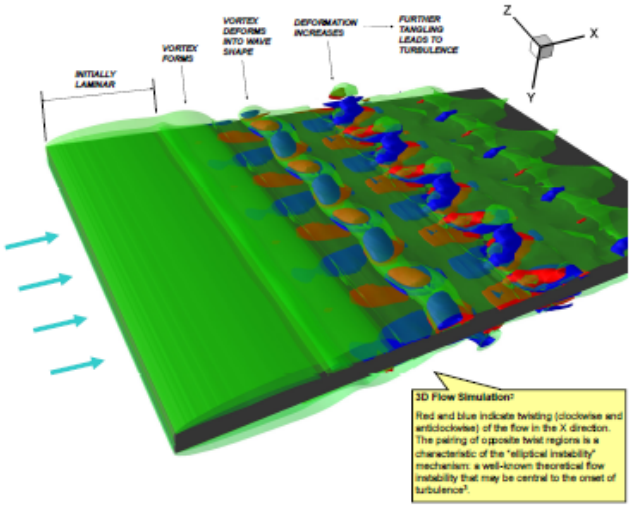
Stability Analysis Results[2]

The flow was subjected to a range of perturbations which were modulated in a wave-like manner across the width of the plate. The wavelength of these perturbations was varied and their growth or decay over time measured. We thereby identified two preferred wavelengths or "instability modes" – the pathways to turbulence.



2D Simulations of Dominant Instability Mode Structure

Here, line contours indicate vortex locations. Red and blue again indicate clockwise and anticlockwise "twisting" in the flow direction. In the bluff plate flow[2] we see twisting occurring only in opposing pairs, confined within vortex cores (a). This distinctive feature of the "elliptical instability"[3] is virtually identical in simulations of completely different wake flow geometries[4] (b,c).



3D Flow Simulation[2]

Red and blue indicate twisting (clockwise and anticlockwise) of the flow in the X direction. The pairing of opposite twist regions is a characteristic of the "elliptical instability" mechanism: a well-known theoretical flow instability that may be central to the onset of turbulence[3].

Key Findings

- **Identified two instability modes with wavelengths ~1*H* and 4-5*H* (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[4].**
- **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.**

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FLAIR

References:

1. Barkley, D. & Henderson, R., 1996, "Three-dimensional Floquet stability analysis of the wake of a circular cylinder", *J. Fluid Mech.* 322, 215-241
2. Chaurasia, H.K. & Thompson, M.C., 2008, "Instabilities in Bluff Plate Boundary Layers", *Proc. 19th ATCFM* (in press)
3. Thompson, M.C., et al., 2001, "The physical mechanism of transition in bluff body wakes", *J. Fluids Struct.* 15, 607-616
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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 B.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

No.

bob.wong@monash.edu

Focus on your key outcomes

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

Get the message into your headings

Unlocking the secrets of turbulence: instabilities in flows over bluff plates

The Problem

Project Goals

Method

Key Findings

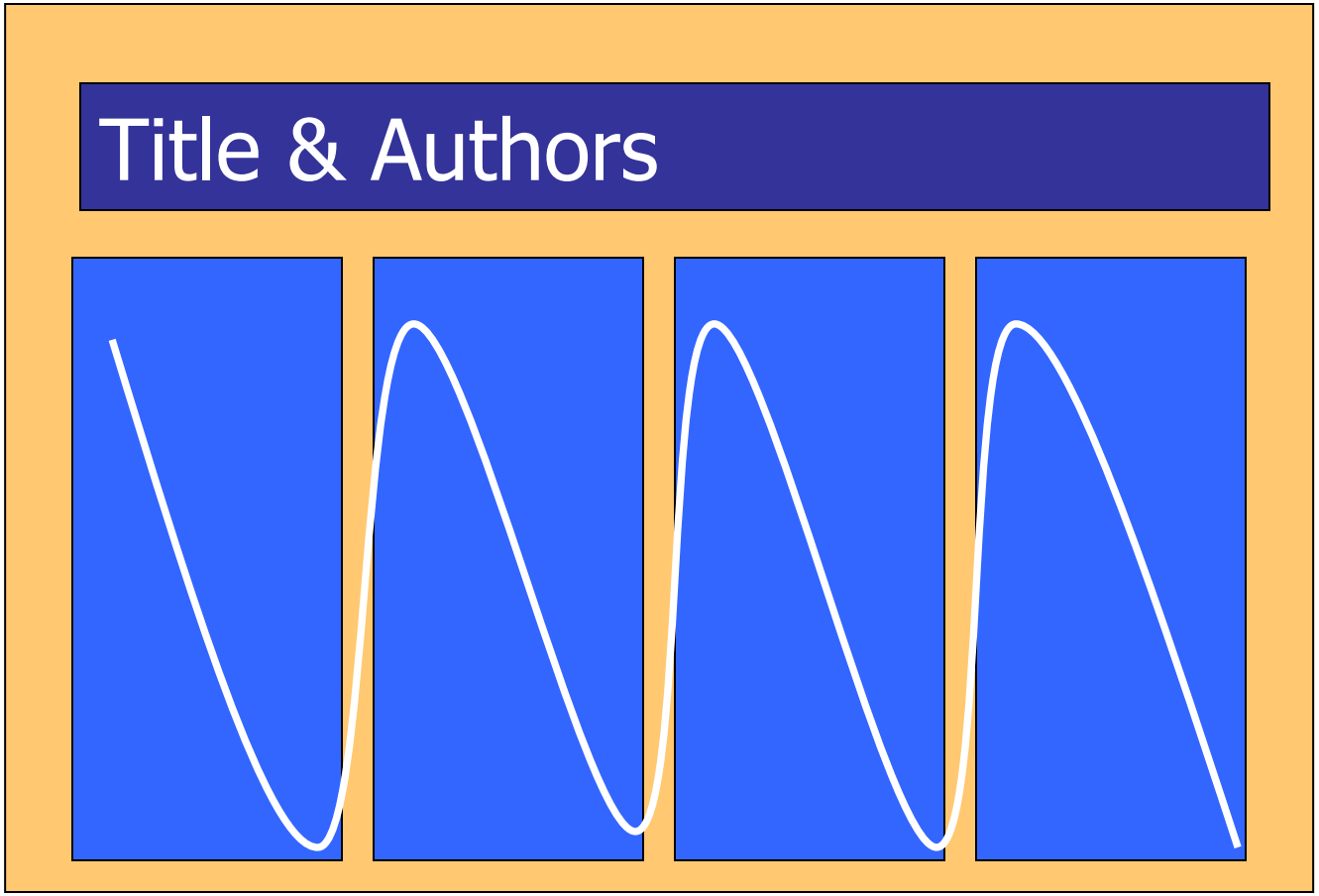
Four key elements in poster design

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



Flows top to bottom, left to right

(Source: Cain Project website)

The Relationship Between Electrovestibulograpy and Parkinson's Disease Severity

Mehrnaz 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.

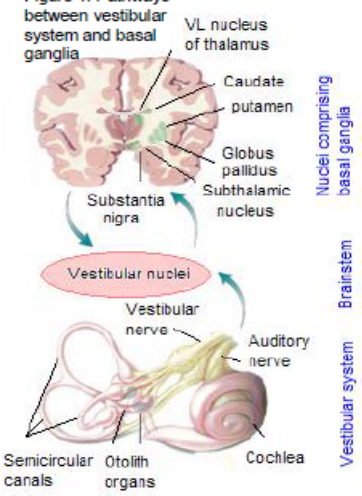
PD is known to be caused by the progressive death of selected populations of dopamine producing neurons in parts of the basal ganglia of the brain (Fig.1).

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.

Figure 1: Pathways between vestibular system and basal ganglia



Objectives

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

Methods

Recordings

•Electrovestibulography (EVestG): A non-invasive technique used to record neuronal 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].

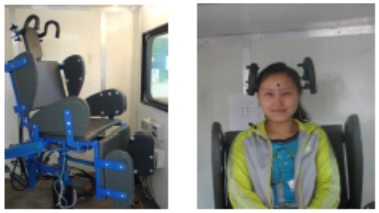


Figure 2: Hydraulic chair

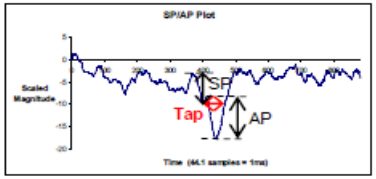


Figure 3: Averaged neural events detected.

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 EVestG signals.

•An SP/AP (sumation 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.

Results

'Tap' measurements versus scores from Webster's Mobility Test.

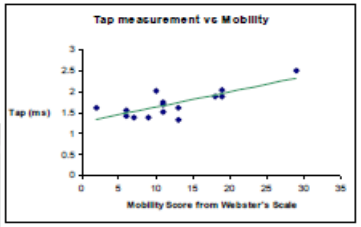


Figure 4

$R^2 = 0.5991$

$p < 0.001$

•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 EVestG recordings are being studied for other potential biomarkers which could help develop a more sensitive and quantitative measure of disease progression.

References

[1] E. J. Visser and B. R. Bloem, "Role of the basal ganglia in balance control," *Neural Plasticity*,12, pp. 161-173, 2005.

[2] M. Shoushtarian and B. Lithgow, "A vestibular diagnostic response", *Journal of Australasian Physical and Engineering Sciences in Medicine*, 27, pp.189-198, 2004.

MONASH University Engineering

L-to-R flow in rows

(Source: Cain Project website)

Towards an Asthma Vaccine: Scalable Process for the Purification of a Latex Allergen Protein

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2: Department of Chemical Engineering, Melbourne, Victoria, 3800, Australia.
3: CRC for Asthma, Dept. of Immunology, Central and Eastern Clinical School, Monash University.
* Corresponding author: gareth.forde@eng.monash.edu.au

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 allergies[2].
- 80% of **occupational asthma** in the healthcare industry is caused by latex allergies[1].

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 cells[3].

What are Inclusion bodies?

…dense aggregates of insoluble mis-folded proteins formed when proteins are over expressed in a cell[3].

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 his-tag absorbent (Ni-NTA Agarose gel) and for contaminant removal.

Asthma CRC

Samples were sent to the **CRC for Asthma** for further analysis and experimentation for **latex allergenicity vaccine project.**

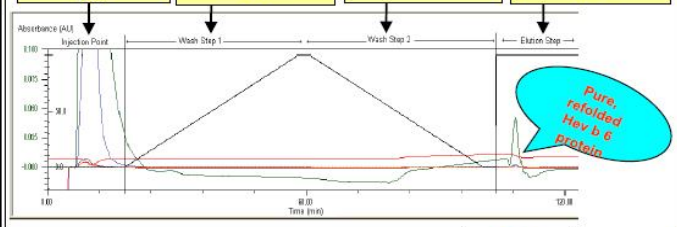
Results – Example Chromatograph

Lysis Buffer: 8M Urea, 100mM Na-Phosphate, 10mM TrisHcl, pH 8.

Wash Buffer: 8M Urea, 100mM Na-Posphate, 10mM TrisHcl, pH 6.3.

Refolding Buffer: 100mM Na-Phosphate, 10mM TrisHcl, pH 6.3.

Elution Buffer: 100mM Na-Phosphate 10mM TrisHcl 20% v/v Glycerol pH 4.5



Conclusions

Successful purification of soluble Hev b 6.

On-column refolding strategies developed for Hev b 6.

High pressure homogenization shown to be a feasible method to increase yields by removing centrifugation stage and enhancing Hev b 6 solubility.

MONASH University Engineering

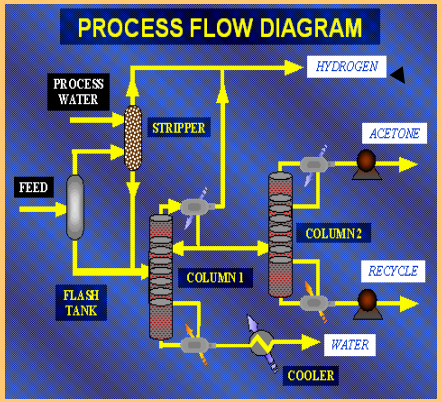
Bio Engineering Laboratory BEL

References: 1. Chen Z, Cremer R, Posch, Raulf-Heimsoth M, Rihs H, Baur X. , 'On the allergenicity of Hev b 1 among the health care workers and patients with spina bifida allergic to natural rubber latex', *J Allergy Clin Immunol.* 1997, 100: 684-93. 2. Drew AC, Nirupama PE, Kenins L, de Silva HD, Suphioglu C, Rolland JM, O'Hehir RE, '*Hypoallergenic Variants of the Major Latex Allergen Hev b 6.01 Retaining Human T Lymphocyte Reactivity*', J Immunol. 2004, 173: 5872 - 5879. 3. Middleberg A.P.J. and O'Neill, B. 'Harvesting Recombinant Protein Inclusion bodies' in *Bioprocessing and Bioseparations*, Wiley Verlag GmbH , 1998, 2: 81-106.

Centered image & explanations

Title & Authors

Abstract



(Source: Cain Project website)

Monash 3D Multimedia Sensor Node

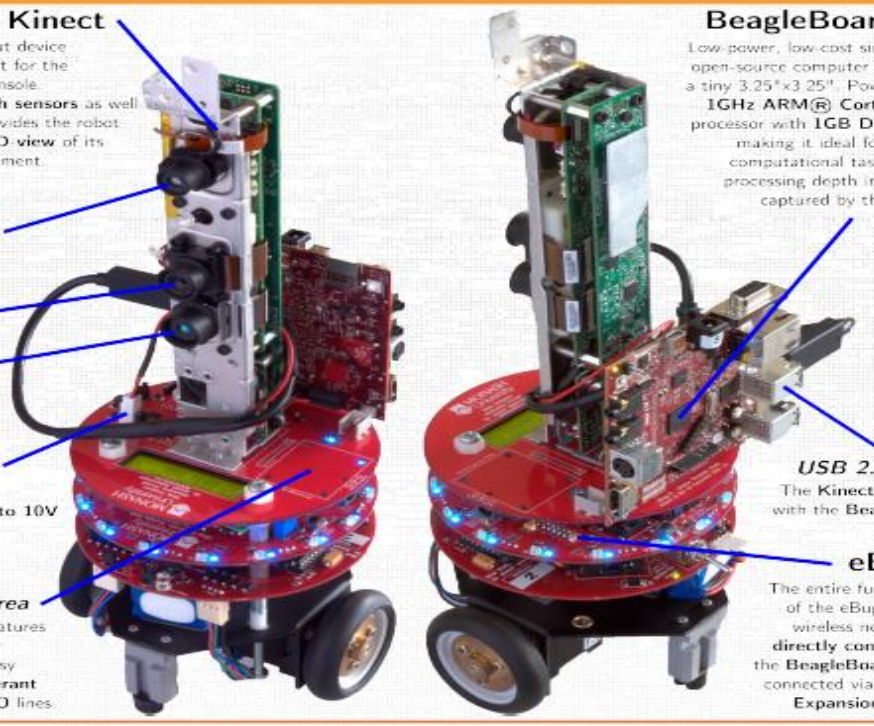
Wireless Sensor and Robot Networks Laboratory

wsrnlab.ecse.monash.edu.au

Introduction

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 on-board **depth sensors** as well as RGB camera provides the robot with a **real-time 3D view** of its surrounding environment.

Infrared Laser Projector

RGB Camera

Monochrome CMOS Sensor

Kinect Power Supply

High-efficiency **5V to 10V step-up** switching converter.

Prototyping Area

The upper-board features a dedicated area for prototyping with easy access to **3.3V-tolerant BeagleBoard GPIO** lines.

BeagleBoard-xM

Low-power, low-cost single-board open-source computer measuring a tiny 3.25"x3.25". Powered by a **1GHz ARM® Cortex** micro-processor with **1GB DDR-RAM** making it ideal for complex computational tasks such as processing depth information captured by the **Kinect**.

USB 2.0 Ports

The **Kinect** interfaces with the **BeagleBoard** via USB.

eBug-II

The entire functionality of the eBug-II mobile wireless node can be **directly controlled** by the **BeagleBoard** as it is connected via the **eBug Expansion Header**.

Credits

Design: Nick D'Ademo, Alexandre Proust

Supervisors: Dr. Ahmet Sekercioglu, Dr. Wai Ho Li

MONASH University Engineering

Department of Electrical and Computer Systems Engineering

GO Boldly.

Two fields in contrast

(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

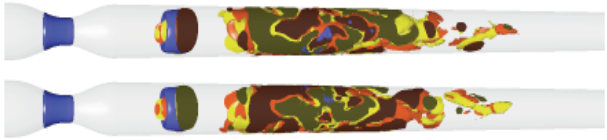
At low Reynolds numbers, a steady axisymmetric jet emanates from the separation line just downstream of the stenosis throat. In the geometry we have studied, a smooth 50% radial stenosis (contraction), the symmetric state has a linear instability at *Re*=722. The instability acts to deflect the jet from 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

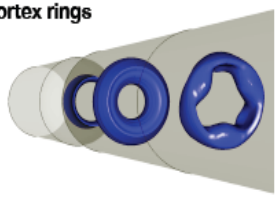
In pulsatile flow, the dominant flow features are vortex rings associated with pulsing, and shear layers that trail behind them when the pulse period lengthens. The vortex rings have at least two kinds of absolute global instability, while the shear layers can be susceptible to convective instability.

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*=400, 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).

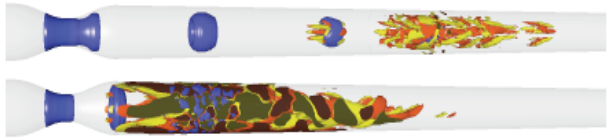


Pulsatile inflow: wavy instability of vortex rings

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 Windnall 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.



Sherwin & Blackburn (2005) *J Fluid Mech* 533: 297-327, Blackburn & Sherwin (2007) *J Fluid Mech*, in press.

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**

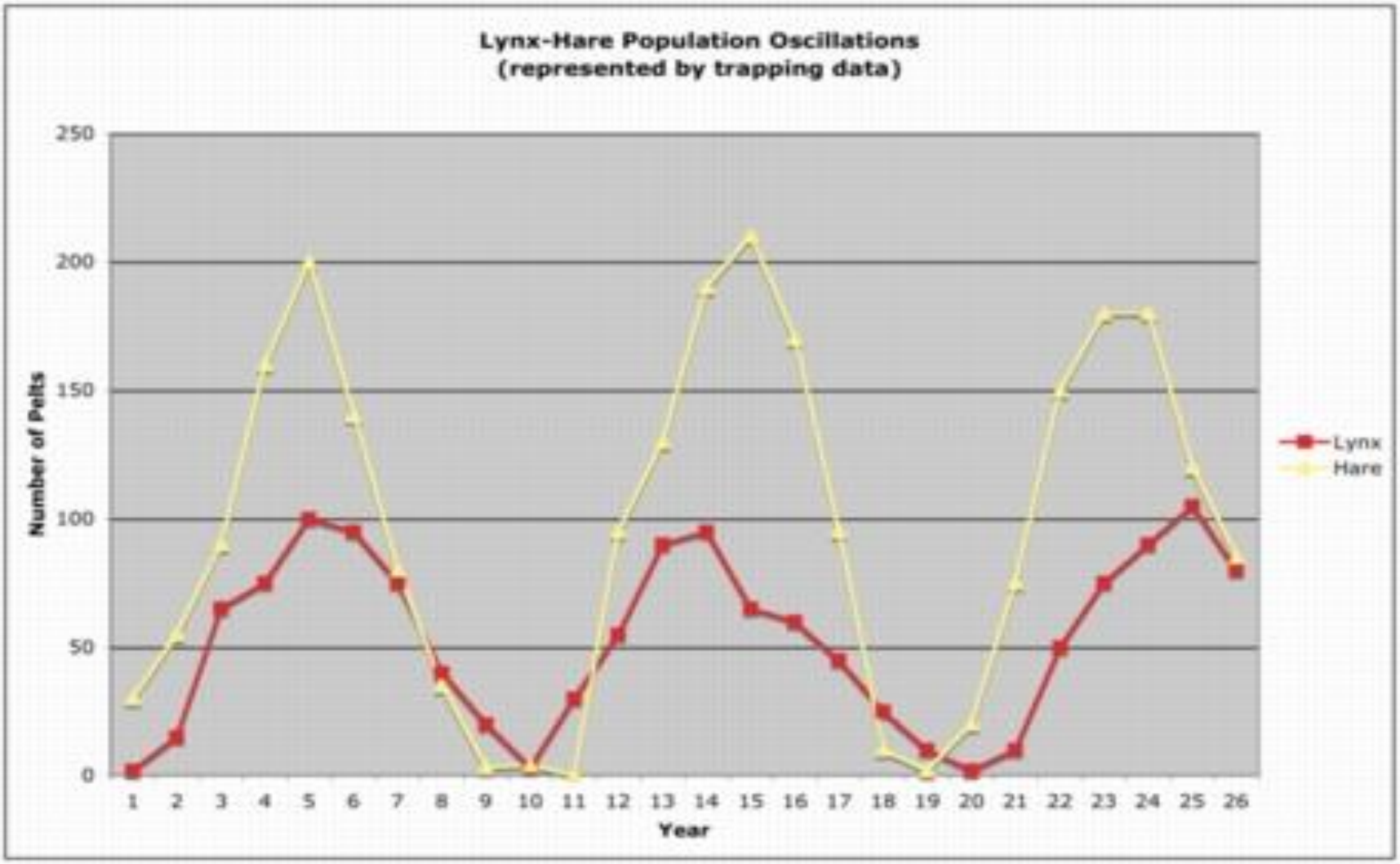
For figures on posters

- 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)

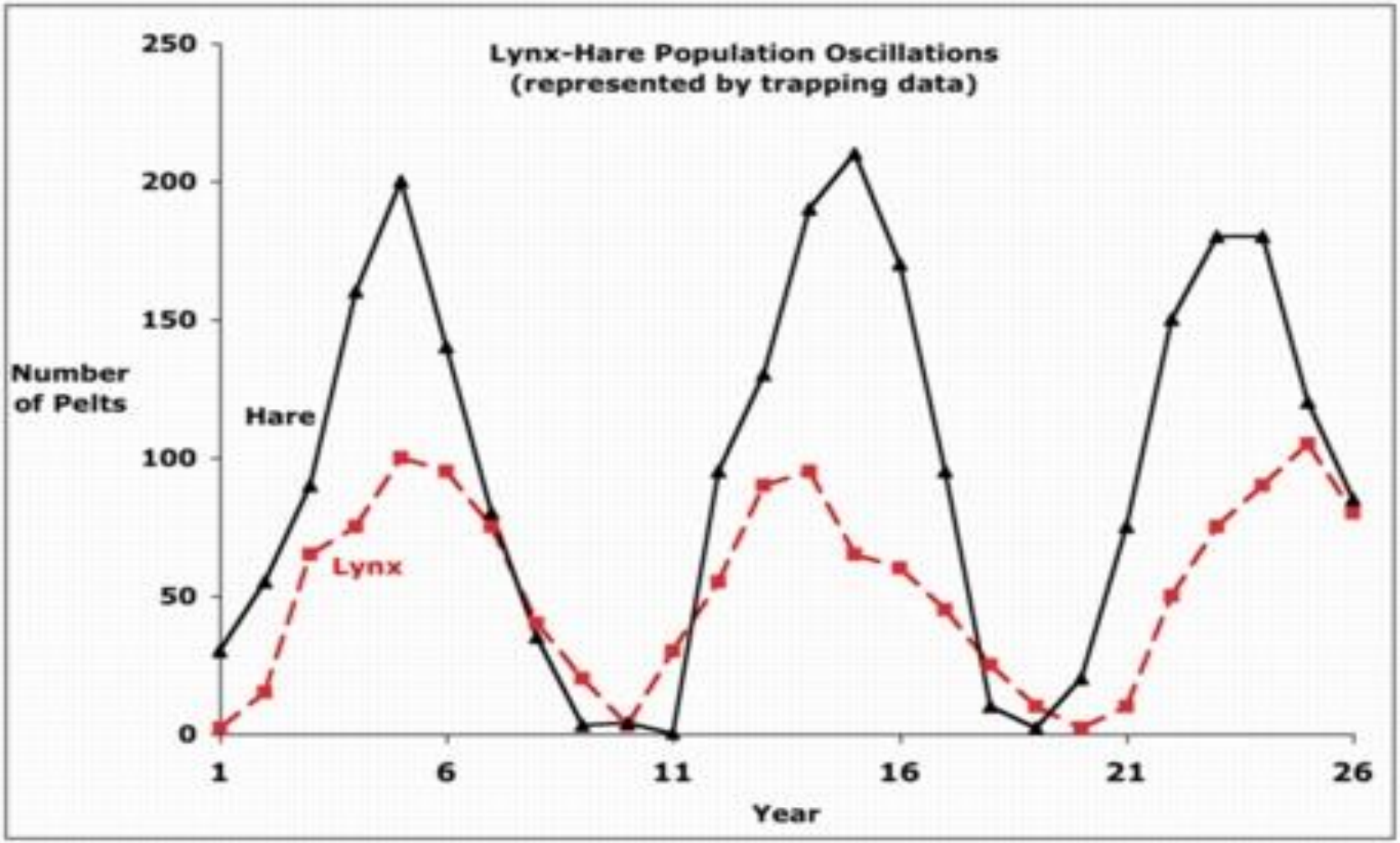
Think of the audience reading your poster, and suggest improvements to the graph on the next slide:

Sample draft slide is difficult to read



Source: Hess et al 2006

Final slide is much clearer



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:

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

Fat Text - - - - to - - - - Lean Text

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

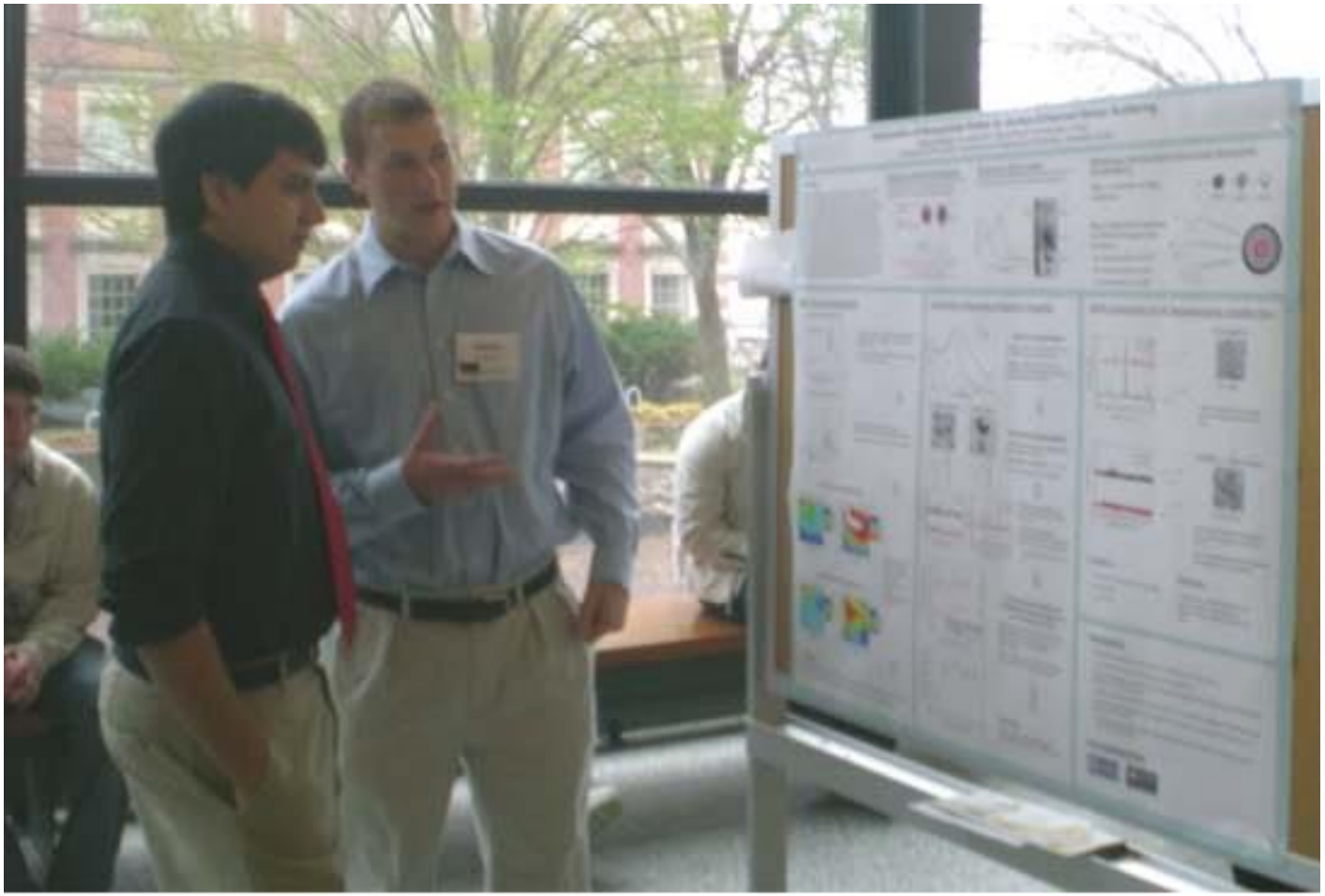
  IT MAKES THE WORDS HARDER TO READ
- **Do not** use capital letters in figure titles

  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 focussing 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)

Source: GR Hess, K Tosney, and L Liegel (2013) Creating Effective Poster Presentations http://www.ncsu.edu/project/posters

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

GR Hess et al (2013) **Creating Effective Poster Presentations**
http://www.ncsu.edu/project/posters

Poster Design Guide, The Cain Project in Engineering and Professional Communication, Rice University, USA. http://www.owlnet.rice.edu/~cainproj/designing.html

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

E Zielinska (2011) **How to drive home your science with a visually pleasing poster**, The Scientist: Magazine of the Life Sciences, http://the-scientist.com/2011/09/01/poster-perfect/

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

Excellent books for designing presentations

R Williams (2010) **The Non-Designers Presentation Book: Principles for effective presentation design**. Peachpit Press, Berkeley California

G Reynolds (2012) **Presentation Zen: Simple ideas on presentation design and delivery.** New Riders, Berkeley California

Interesting articles on visual communication principles:

R Pedwell et al (2016) *Effective Visual Design and Communication Practices for Research Posters*, **Biochemistry and Molecular Education**

D Matthews (1990) *The Scientific Poster: Guidelines for Effective Visual Communication*, **Technical Communication**