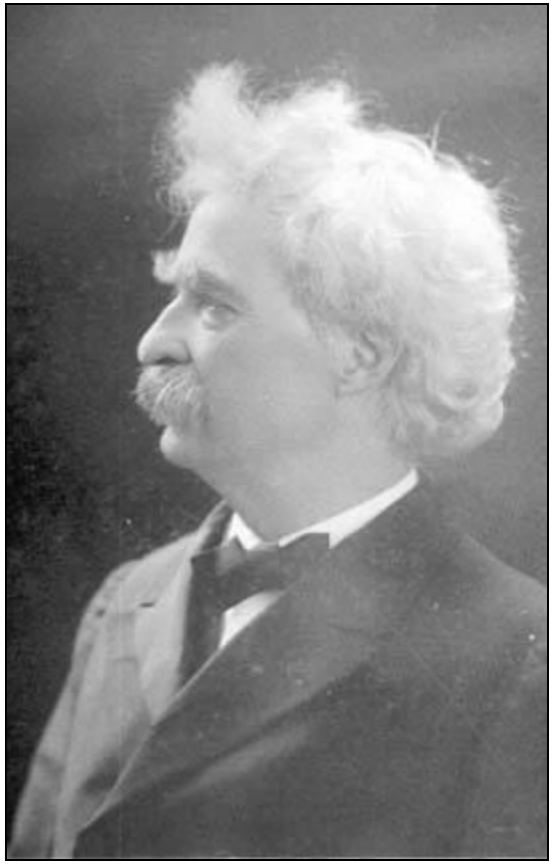
How To Design and Make a Poster

Sept 1st, 2011

Obligatory Quotation

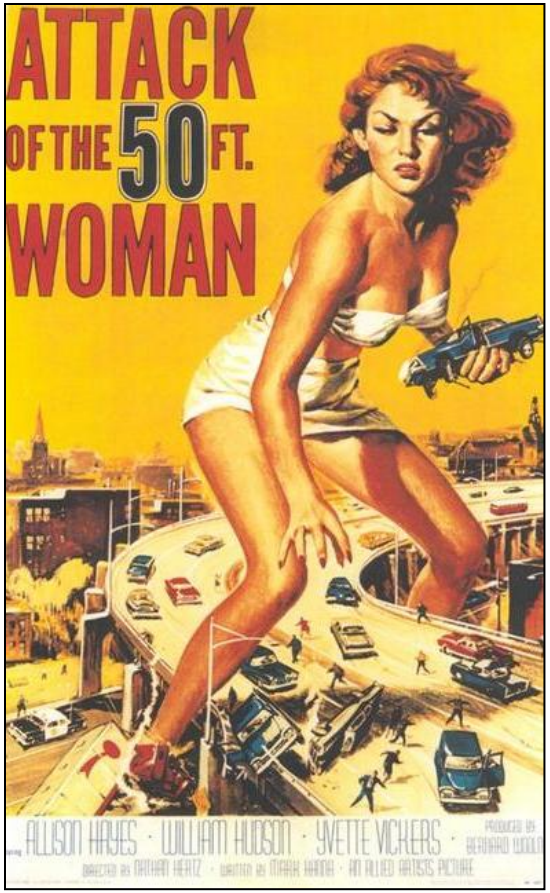
Many a small thing has been made large by the right kind of advertising

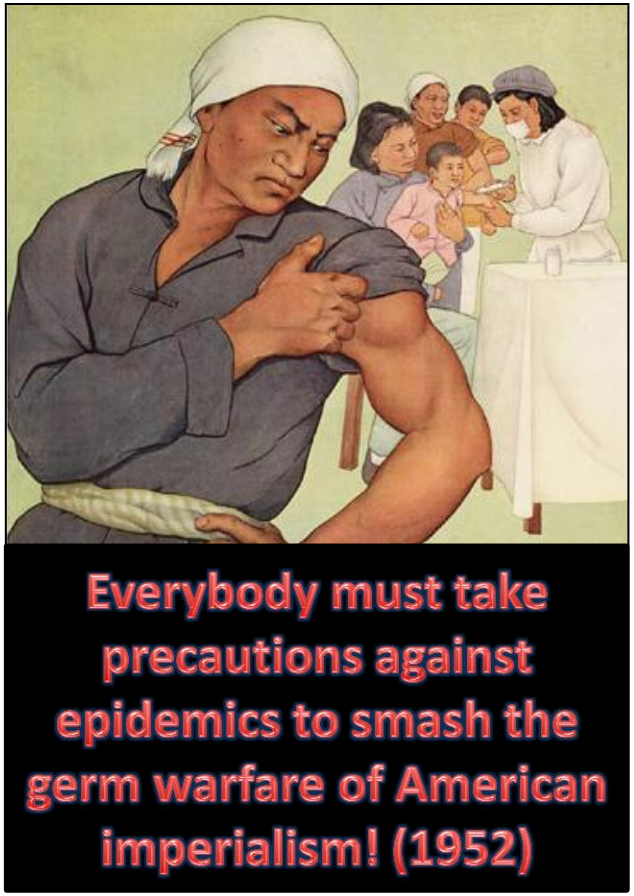
Mark Twain



Some Classic Posters

These are great – for non-scientific purposes;





Scientific Posters

Must grab the audience, but must also inform…

Contents

Posters are illustrated abstracts; they need to be

- Large
- Easily-digested
- Captivating – i.e. they get/keep your attention

Use of PowerPoint is assumed. LaTeX can be used, to good effect – but this is non-trivial, and not recommended for your first poster

Large – paper size

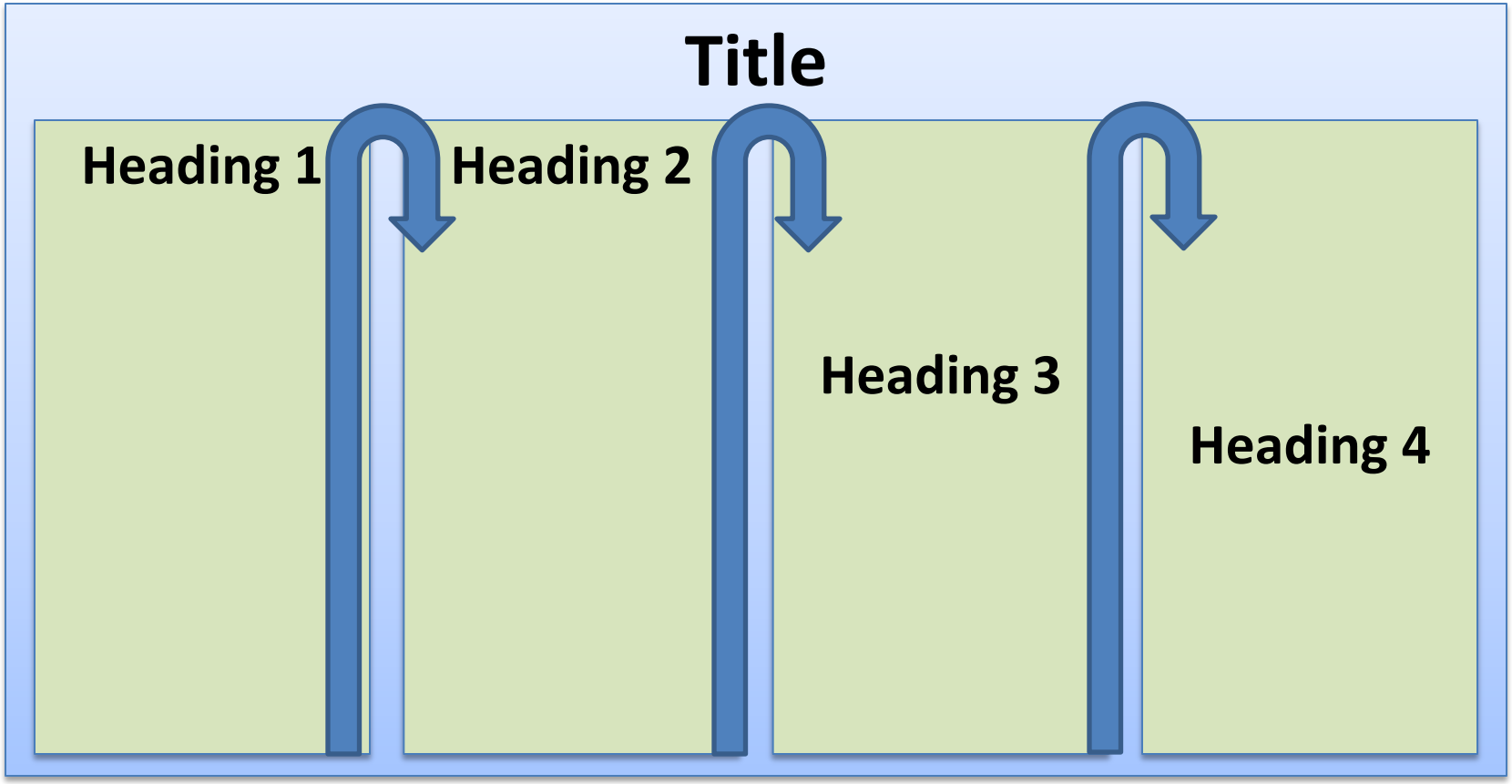
- The posters will be 24 × 36 inches
- Tell this to PowerPoint (Design/Page Setup)
- Leave ½ inch ‘gutter’ around the edge

Easily digested

- Layout
- Fonts
- Use of pictures
- Bulleting
- Clear/minimal math
- Lean text

Easily digested – layout

Readers read from left to right, and down;



Easily digested – layout

OPTIONAL LOGO HERE

Professional Template for a 72x48 poster presentation

Your name and the names of the people who have contributed to this presentation go here.
The names and addresses of the associated institutions go here.

OPTIONAL LOGO HERE

About this template

This template was designed to produce a 48x72 poster.
You can modify it as needed for your presentation before you send it back to PosterPresentations.com for premium quality, same day (rush-free) affordable printing.

By using this template poster will look professional, easy to read and save you valuable time from figuring out proper placement of titles, subtitles and text body.

For poster design beginners we have included many helpful tips you can find on the poster template itself.
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Poster Basics – Poster Layout

To start using this template you first need to delete most of the contents of this page. Keep the poster title and one of the blue section headers.
The cleared template should now look like in Figure 1.
After you decide how many sections you need for your poster (Introduction, Methods, Results, References, etc.), use the "copy" and "paste" commands to create as many copies of the blue section headers as needed.
Move the header copies approximately to where you think they need to be on the poster, so you can get a better sense of the overall poster layout. It will help you organize your content. See Figure 2.

You can now start adding your text.
To add text use the text tool to draw a text box starting from the left edge of a column to the right edge and start typing in your text. You can also paste the text you may have already copied from another source. See Figure 3.
Repeat the process throughout the poster as needed.

Figure 1 Figure 2 Figure 3

Text Sizes

For this template we use the Arial font family at several recommended text sizes. You can use any typeface you like and at any size but try to stay close to the suggested limits.
Figure 4 gives a visual reference of what different font sizes look like when printed at 100% and at 200%.
Due to a page size limitation in PowerPoint and unless your poster is going to be less than 56" in length, all the work done on this template is at half the size of the final poster. For example, if you choose a 21 point font for this poster, the actual printed size will appear as 42 points.

Figure 4

Changing the poster's column layout

Depending on how you layout your poster, you may want to change the column layout configuration.
For your convenience, we have included alternate master layouts. To select a different layout go to FORMAT>SLIDE DESIGN (Figure 5). The slide design pane will open. From there you can select an alternate layout (Figure 6).

Figure 5 Figure 6

Customizing the template color schemes

For those who wish to further personalize their poster presentation, we have included a number of printer-tested alternative color schemes for this poster template.
If you want to change the default colors and use your own color scheme, go to FORMAT>SLIDE DESIGN (Figure 7). The SLIDE DESIGN pane will open. Select COLOR SCHEMES (Figure 8). There, you can try different color schemes until you find the one you like.

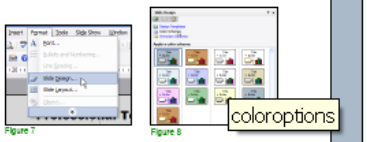

Figure 7 Figure 8

Importing Photographs

It is highly recommended to use the largest images you have access to for your poster. Avoid images downloaded from the web and avoid copying and pasting images instead of using the "Insert" command.
To insert an image to your poster go to INSERT>PICTURE>FROM FILE (Figure 9).

(Figure 9)

When the only source of a needed photo or graphic is the Web, scaling has to be applied with caution. Scaling an image more than three times its original size may introduce pixelization artifacts. Refer to figure 10 as an example. A simple way to preview the printing quality of an image is to zoom in at 100% or 200%, depending on the final size of the poster. What you'll see is likely what you'll get at printing time.

Figure 10: Original image at 100%, enlarged 200% and 400%.

Importing Tables & Graphs

Importing tables, charts and graphs is easier than importing photos.
To import charts and graphs from Excel, Word or other applications, go to EDIT>COPY, copy your chart and come back to PowerPoint.
Go to EDIT>PASTE and paste the chart on the poster. You can scale your charts and tables proportionally by holding down the Shift key and dragging in or out one of the corners.

TABLE ONE		
1998	1999	2000
2001	2002	2003
2004	2005	2006

Labeling your headers

The blue headers are used to identify and separate the main topics of your presentation. The most commonly used headers in poster presentations are:

Introduction, Summary or Abstract	Conclusion
Materials and Methods	Literature Cited
Results	Acknowledgements

Research Poster Design Services

Are you too busy or somewhat "PowerPoint-challenged" and would you like to have your poster presentation professionally designed, printed and delivered on time for your meeting?

We'll be happy to provide you with our expertise.
All you would need is to email us the following:

- A Word document with all your text or your multi-page PowerPoint document.
- Your logos, photos, charts, graphs and tables.
- Your deadline!

That's it!

Your presentation will be ready within 24 to 48 hours and a proof will be emailed to you for revisions and final approval. Once we have your approval, your poster will be printed and shipped by next day or second day FedEx to your work, home or hotel.

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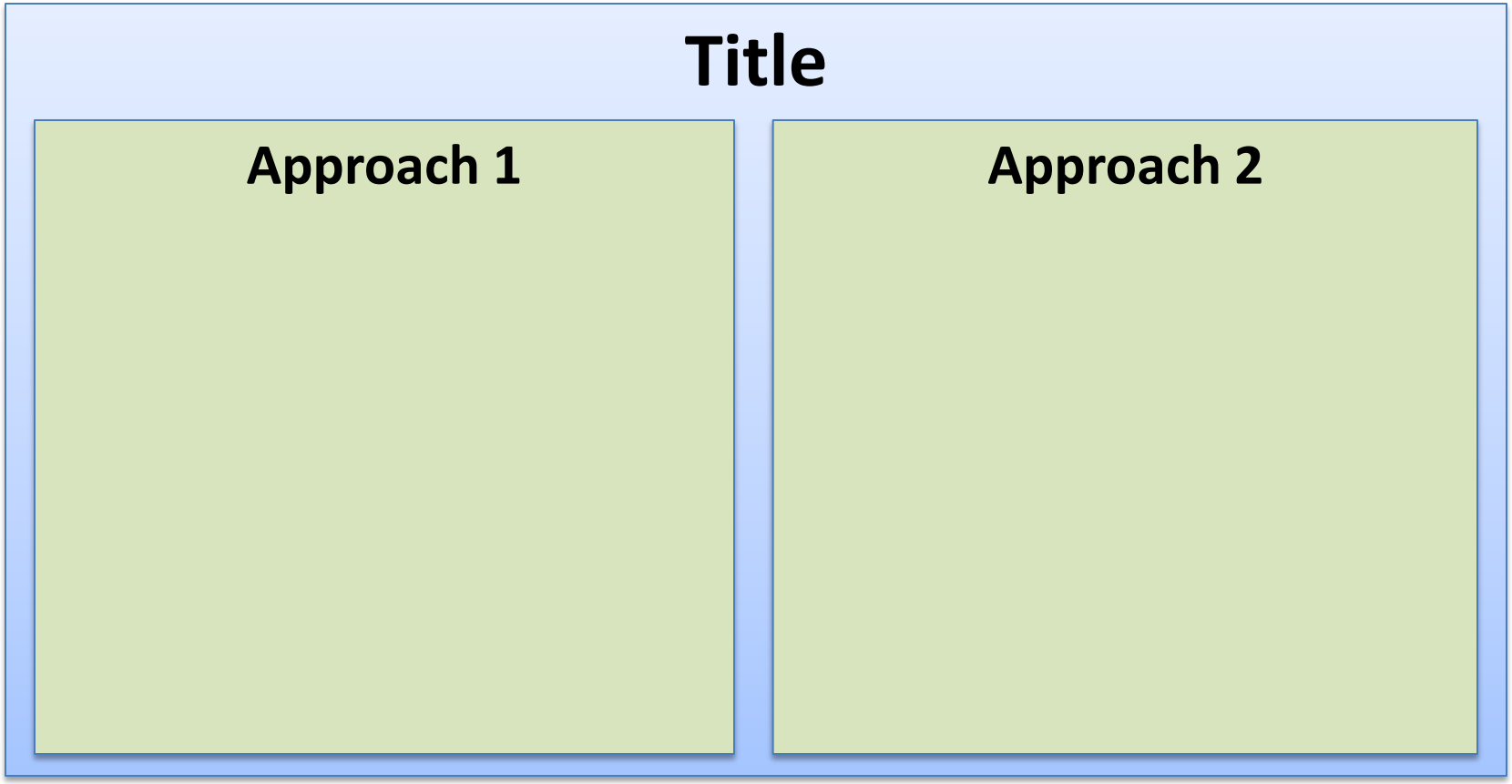
Easily digested – layout

Readers read from left to right, and down;



Easily digested – layout

Two column example;

Teaching Programming with DrJava

Charles Reis, Eric Allen, Corky Cartwright
{creis, eallen, cork}@rice.edu

Ideal for Teaching Beginners...

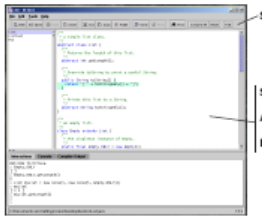
Problem: Complex Development Environments

- Confusing interfaces, often huge and buggy
- Code generation: ineffective for teaching students

Solution: Simplicity & Interaction

- DrJava: simple to use, stable, and small
- Powerful, intuitive features
- Users interact with the code

Intuitive and Interactive



Interactions Pane:

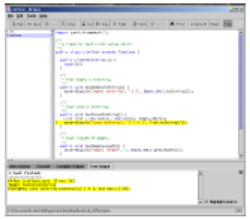
- Evaluate expressions and statements on the fly
- Create objects, call methods
- Test program behavior
- Experiment with new classes and libraries

Integrated Compiler:

- Highlights lines with compile errors
- Supports compiling with generics (GJ or JSR-14)

Support for Unit Testing (JUnit)

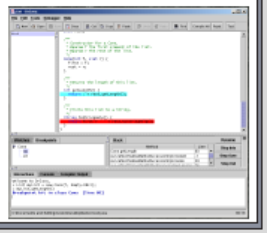
- Run a set of tests with the `Test` button
- Highlights tests that fail
- Encourages students to write tests
- Useful for grading projects



Integrated Debugger

- Complements the Interactions Pane
- Tracks down bugs
- Useful for even advanced programmers

- Set Breakpoints
- Step through code
- Watch values



Future Plans:

- Language Levels: simple subsets of Java
- View Classes as UML Diagrams

And Production Programmers

Problem:

Students are not prepared for Production Programming

- Assignments are written and forgotten
- No real customers to support
- No project maintenance

Solution:

Extend DrJava as Course Project

- Students add features to DrJava in Software Engineering course
- Experienced TAs transfer knowledge, manage projects

Open Source

SourceForge:

- Professional Management Tools
- Free Project Hosting

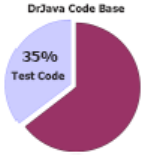
Leverage Existing Work:

- Ant: Build Scripting Tool
- JUnit: Unit Test Framework
- DynamicJava: Java Interpreter

Extreme Programming

Fully Unit Tested

- Unit Tests keep DrJava stable, reliable
- Students can safely change the code: Tests are a safeguard



Active Customer Feedback

- Students themselves are customers (Users of DrJava)
- Used by universities and developers around the world
- Over 12,000 downloads in a year
- Students respond to feedback:
  - Feature Requests
  - Bug Reports

Required Pair Programming

- Better design, fewer bugs
- Knowledge transfer among students
- Sustainable: Students can become project managers as TAs
- Schedule class time for pairing

Frequent Releases

- Students get feedback as course progresses

Students get experience with a production environment!

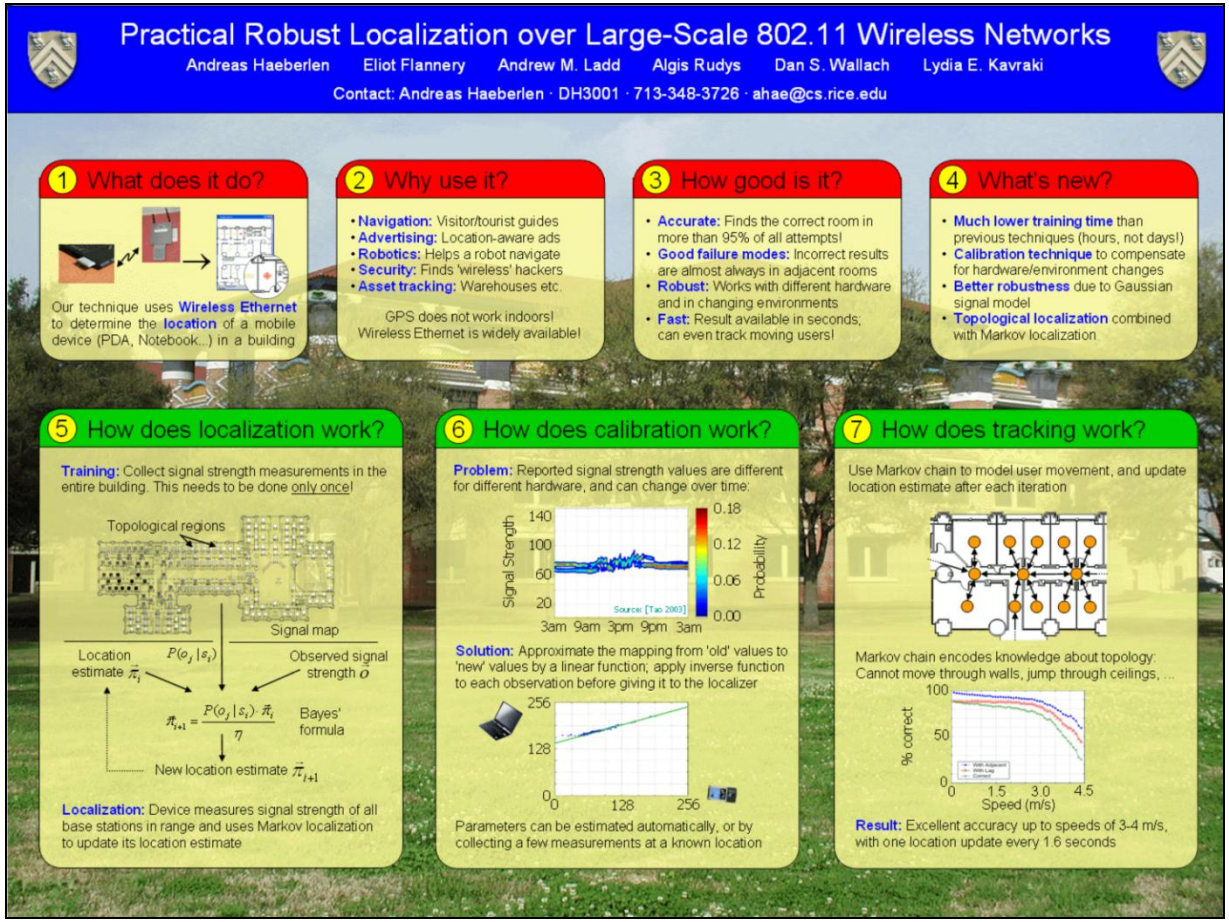
DrJava is available at `http://drjava.org`

Easily digested – layout

Readers read from left to right, and down;

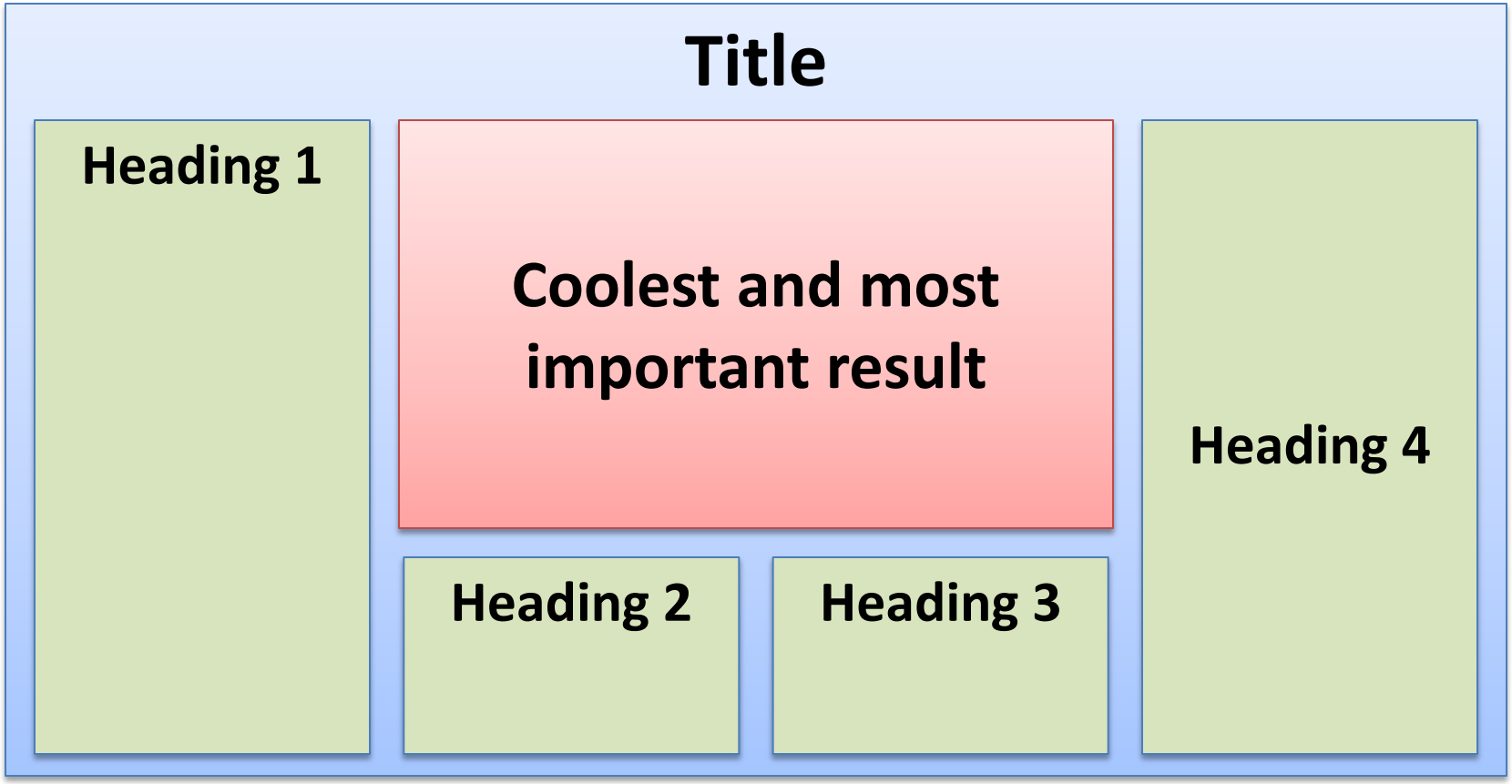
Easily digested – layout

Two row example; (with over-busy background)



Easily digested – layout

Readers read from left to right, and down;



Easily digested – layout

A work of staggering genius; (note authorship)

Methodologic challenges in studying incident hypertension: lessons from TROPHY

Thomas Lumley, Kenneth M. Rice, Bruce M. Psaty
Departments of Biostatistics, Epidemiology, Medicine, and Cardiovascular Health Research Unit, University of Washington, Seattle, Washington

BACKGROUND

Prevention and treatment of hypertension is a major component of strategies to prevent heart disease. Because blood pressure has substantial measurement error and day-to-day variability, the incidence rate for diagnosed hypertension is sensitive to the number of blood pressure measurements made and the number of over-threshold measurements used to define incident hypertension. Similar concerns apply to studies of incident diabetes mellitus defined by fasting glucose or glucose tolerance tests.

TROPHY (N Engl J Med 2006; 354: 1685-97) randomized prehypertensive subjects to two years of double-blind treatment with candesartan vs placebo and an additional two years of untreated follow-up, with the primary aim of preventing the onset of hypertension. Blood pressure was lowered during treatment, as expected. TROPHY also reported a 10% reduction in cumulative incidence of hypertension in the candesartan group, two years after stopping treatment (53% vs 63%, p=0.007) and interpreted this as evidence of a long-lasting carryover effect.

We performed simulation studies to explore whether measurement error in blood pressure could give an alternative explanation for this data.

METHODS

The figures below show the steps in simulating data:

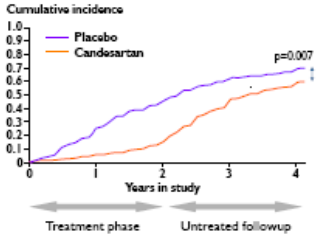
1. Long-term average blood pressure simulated uniformly from TROPHY-eligible range (130/80–140/90mmHg). Trend of 1/0.5 mmHg per year and treatment effect then added.
2. Random variability and measurement error added from Normal distribution to give measurements for an individual
3. As in TROPHY, incident hypertension defined when three measurements exceed 140/90

Simulation scenarios varied the measurement variability in blood pressure, the carryover effect of treatment, the spacing of blood pressure measurements, and the definition of hypertension. Measurement variability was chosen to give similar incidence of hypertension in the control group to that observed in TROPHY. Treatment effect was a reduction of 8/6mmHg during treatment. Type I error rates were estimated from 10000 replications of null simulations.

All simulations were programmed in the R statistical system. All code is available from the authors on request and will be posted at http://faculty.washington.edu/tlumley/inc_hyper/ following publication.

TROPHY's "carryover" effect

Powerpoint figure recolored from http://www.astrazeneca.com/ (© AstraZeneca).

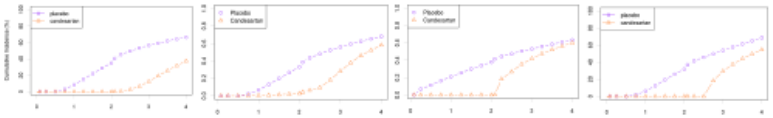


Simulation with no carryover

Treatment effect: 8/6mmHg, trend 1/0.5mmHg per year, measurement error standard deviation 3/2mmHg.

Type I error: Under null hypothesis, 5% of trials should show (false) positive result. But as above, with no carryover effect, 80% of simulated trials with TROPHY's design show false positive result.

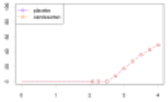
SENSITIVITY ANALYSES



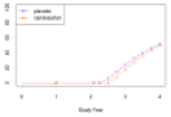
No time trend in blood pressure. | Treatment effect varies between individuals (0-2 × average effect) | Hypertension defined by two consecutive measurements | True carryover effect = 2/1mmHg

DESIGNING FOR CARRYOVER EFFECTS

Measurements during the treatment phase cause problems in defining and estimating carryover effects. One simple solution is to make no measurements during the treatment phase, if this is ethically permissible.



The JNC recommendation in prehypertension is for annual measurements. Measuring only at year 1 gives an imperfect but possibly acceptable compromise design with Type I error rate of 7% in the absence of any true carryover.



DEFINING CARRYOVER EFFECTS

Choosing a metric to quantify carryover benefits is difficult. Some possible summaries of the results of TROPHY are:

	Candesartan	Placebo	Difference
Cumulative incidence at four years	53.2%	63.0%	-10%
Cumulative incidence over years 2-4	39.6%	22.6%	+17%
Cumulative incidence over first two untreated years	40.4%	40.4%	0%
Uncontrolled hypertension at 4 years	6%	5%	+1%
Mean blood pressure years 2 to 4	~133/95	~135/96	-2/1
Serious cardiovascular adverse event	0.3%	1.5%	-1.2%
Median time without hypertension or medication	1.3yr	2.2yr	**0.9yr**

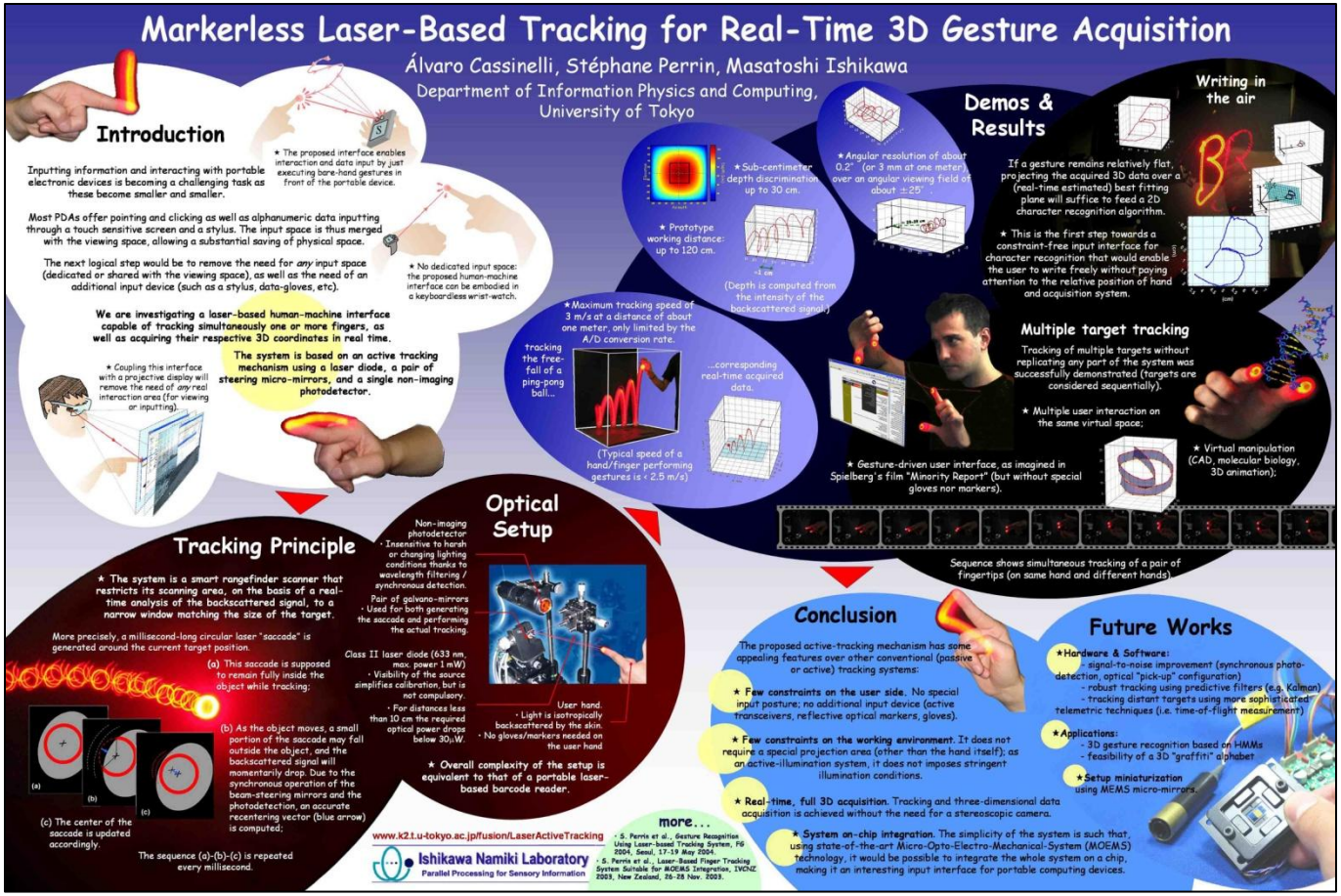
Difference is color coded to indicate which treatment appears better. Boldface indicates statistically significant differences. Blood pressure estimated from Figure 4 of manuscript, time to hypertension given on p1692, other data taken from Table 2.

CONCLUSIONS

- Naïve estimation of carryover effects may be misleading even in a randomized trial. Measurement error issues must be considered at the design stage.
- The incidence curves in the TROPHY trial can be replicated under plausible simulation conditions with no true carryover effect. The published results do not reliably demonstrate any carryover effect of candesartan.
- We found a statistically significant carryover effect in 80% of simulations when no true carryover was present.
- TROPHY recommends measuring blood pressure in prehypertensives more frequently than JNC guidelines, but the TROPHY data do not address this question.
- Assessing carryover effects of any other risk-factor prevention intervention would present the same methodologic challenges.

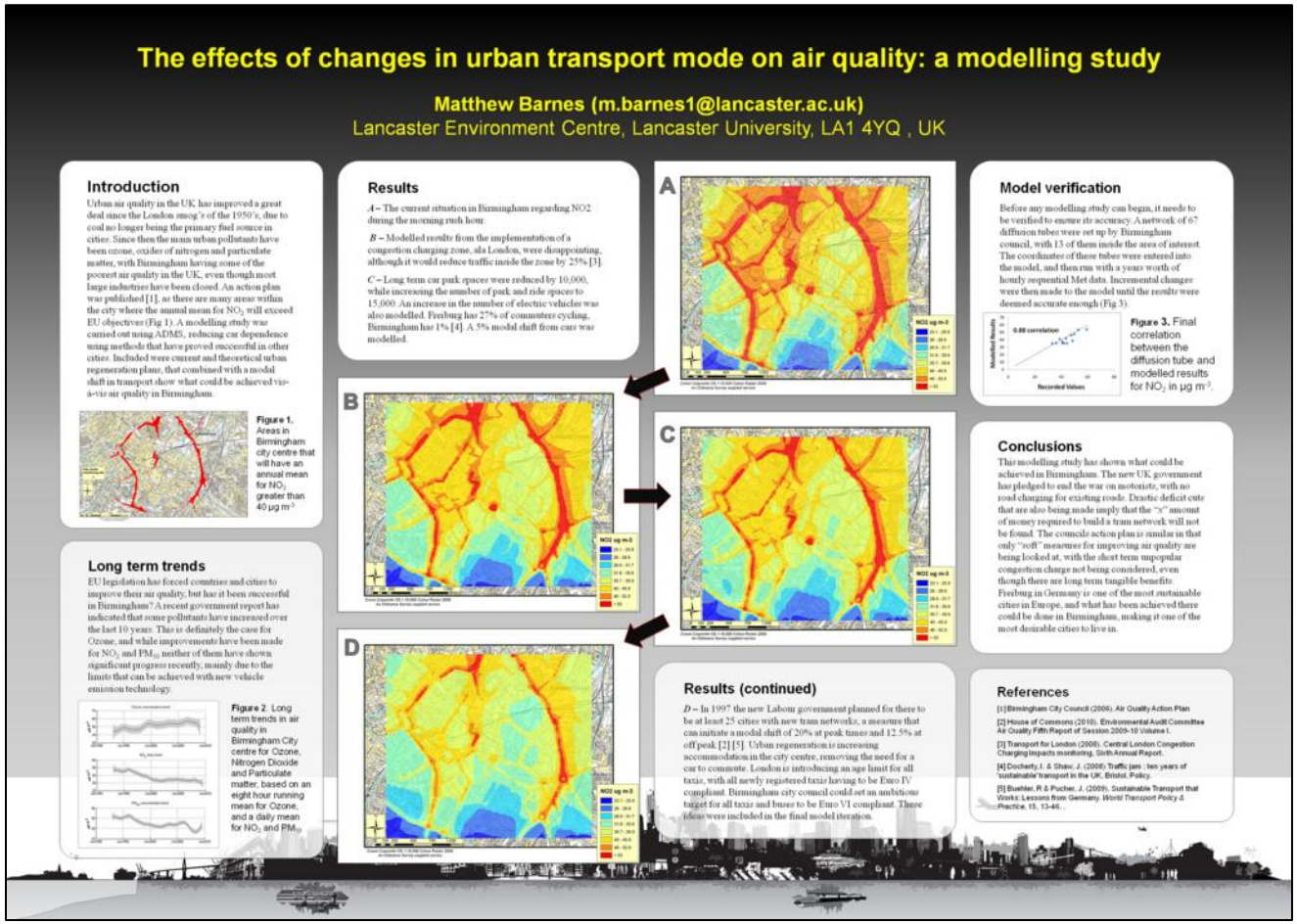
Easily digested – layout

With careful preparation, other formats work…



Easily digested – layout

… but arrows indicate over-complexity;



The effects of changes in urban transport mode on air quality: a modelling study

Matthew Barnes (m.barnes1@lancaster.ac.uk)
Lancaster Environment Centre, Lancaster University, LA1 4YQ , UK

Introduction

Urban air quality in the UK has improved a great deal since the London smog'r of the 1950's, due to coal no longer being the primary fuel source in cities. Since then the main urban pollutants have been ozone, oxides of nitrogen and particulate matter, with Birmingham having some of the poorest air quality in the UK, even though most large industries have been closed. An action plan was published [1], as there are many areas within the city where the annual mean for NO_2 will exceed EU objectives (Fig 1). A modelling study was carried out using ADMS, reducing car dependence using methods that have proved successful in other cities. Included were current and theoretical urban regeneration plans, that combined with a modal shift in transport show what could be achieved vis-à-vis air quality in Birmingham.

Figure 1. Areas in Birmingham city centre that will have an annual mean for NO_2 greater than 40 µg m^{-3}

Long term trends

EU legislation has forced countries and cities to improve their air quality, but has it been successful in Birmingham? A recent government report has indicated that some pollutants have increased over the last 10 years. This is definately the case for Ozone, and while improvements have been made for NO_2 and PM_{10} neither of them have shown significant progress recently, mainly due to the limits that can be achieved with new vehicle emission technology.

Figure 2. Long term trends in air quality in Birmingham City centre for Ozone, Nitrogen Dioxide and Particulate matter, based on an eight hour running mean for Ozone, and a daily mean for NO_2 and PM_{10}

Results

A – The current situation in Birmingham regarding NO2 during the morning rush hour.

B – Modelled results from the implementation of a congestion charging zone, ala London, were disappointing, although it would reduce traffic inside the zone by 25% [3].

C – Long term car park spaces were reduced by 10,000, while increasing the number of park and ride spaces to 15,000. An increase in the number of electric vehicles was also modelled. Freiburg has 27% of commuters cycling, Birmingham has 1% [4]. A 5% modal shift from cars was modelled.

A

B

C

D

Results (continued)

D – In 1997 the new Labour government planned for there to be at least 25 cities with new tram networks, a measure that can initiate a modal shift of 20% at peak times and 12.5% at off peak [2] [5]. Urban regeneration is increasing accommodation in the city centre, removing the need for a car to commute. London is introducing an age limit for all taxis, with all newly registered taxis having to be Euro IV compliant. Birmingham city council could set an ambitious target for all taxis and buses to be Euro VI compliant. These ideas were included in the final model iteration.

Model verification

Before any modelling study can begin, it needs to be verified to ensure its accuracy. A network of 67 diffusion tubes were set up by Birmingham council, with 13 of them inside the area of interest. The coordinates of these tubes were entered into the model, and then run with a years worth of hourly sequential Met data. Incremental changes were then made to the model until the results were deemed accurate enough (Fig 3).

Figure 3. Final correlation between the diffusion tube and modelled results for NO_2 in µg m^{-3}.

Conclusions

This modelling study has shown what could be achieved in Birmingham. The new UK government has pledged to end the war on motorists, with no road charging for existing roads. Drastic deficit cuts that are also being made imply that the "x" amount of money required to build a tram network will not be found. The councils action plan is similar in that only "soft" measures for improving air quality are being looked at, with the short term unpopular congestion charge not being considered, even though there are long term tangible benefits. Freiburg in Germany is one of the most sustainable cities in Europe, and what has been achieved there could be done in Birmingham, making it one of the most desirable cities to live in.

References

[1] Birmingham City Council (2006). Air Quality Action Plan

[2] House of Commons (2010). Environmental Audit Committee Air Quality Fifth Report of Session 2009-10 Volume I.

[3] Transport for London (2008). Central London Congestion Charging Impacts monitoring, Sixth Annual Report.

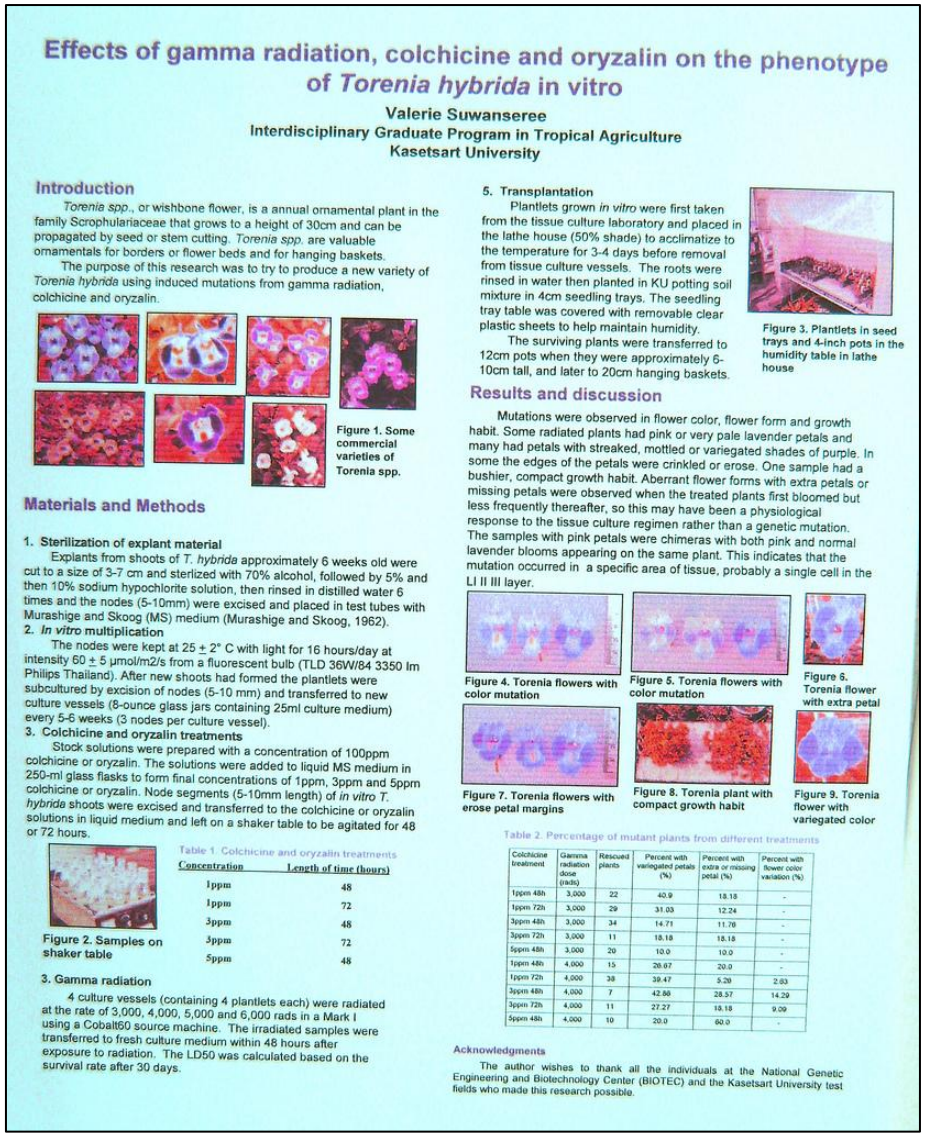
[4] Docherty, I. & Shaw, J. (2008) Traffic jam : ten years of 'sustainable' transport in the UK. Bristol, Policy.

[5] Buehler, R. & Pucher, J. (2009). Sustainable Transport that Works: Lessons from Germany. *World Transport Policy & Practice*, 15, 13-46.

Easily digested – formatting

Line stuff up!

- Align/Distribute
- Snap to Grid
- Snap to Objects
- Height, Width
- Crop
- Use tabs, & tables



Effects of gamma radiation, colchicine and oryzalin on the phenotype of *Torenia hybrida* in vitro

Valerie Suwanseree
Interdisciplinary Graduate Program in Tropical Agriculture
Kasetsart University

Introduction

Torenia spp., or wishbone flower, is a annual ornamental plant in the family Scrophulariaceae that grows to a height of 30cm and can be propagated by seed or stem cutting. *Torenia spp.* are valuable ornamentals for borders or flower beds and for hanging baskets.

The purpose of this research was to try to produce a new variety of *Torenia hybrida* using induced mutations from gamma radiation, colchicine and oryzalin.

Figure 1. Some commercial varieties of Torenia spp.

Materials and Methods

1. Sterilization of explant material

Explants from shoots of *T. hybrida* approximately 6 weeks old were cut to a size of 3-7 cm and sterlized with 70% alcohol, followed by 5% and then 10% sodium hypochlorite solution, then rinsed in distilled water 6 times and the nodes (5-10mm) were excised and placed in test tubes with Murashige and Skoog (MS) medium (Murashige and Skoog, 1962).

2. *In vitro* multiplication

The nodes were kept at 25 ± 2° C with light for 16 hours/day at intensity 60 ± 5 µmol/m2/s from a fluorescent bulb (TLD 36W/84 3350 lm Philips Thailand). After new shoots had formed the plantlets were subcultured by excision of nodes (5-10 mm) and transferred to new culture vessels (8-ounce glass jars containing 25ml culture medium) every 5-6 weeks (3 nodes per culture vessel).

3. Colchicine and oryzalin treatments

Stock solutions were prepared with a concentration of 100ppm colchicine or oryzalin. The solutions were added to liquid MS medium in 250-ml glass flasks to form final concentrations of 1ppm, 3ppm and 5ppm colchicine or oryzalin. Node segments (5-10mm length) of *in vitro T. hybrida* shoots were excised and transferred to the colchicine or oryzalin solutions in liquid medium and left on a shaker table to be agitated for 48 or 72 hours.

Figure 2. Samples on shaker table

Table 1. Colchicine and oryzalin treatments

Concentration	Length of time (hours)
1ppm	48
1ppm	72
3ppm	48
3ppm	72
5ppm	48

3. Gamma radiation

4 culture vessels (containing 4 plantlets each) were radiated at the rate of 3,000, 4,000, 5,000 and 6,000 rads in a Mark I using a Cobalt60 source machine. The irradiated samples were transferred to fresh culture medium within 48 hours after exposure to radiation. The LD50 was calculated based on the survival rate after 30 days.

5. Transplantation

Plantlets grown *in vitro* were first taken from the tissue culture laboratory and placed in the lathe house (50% shade) to acclimatize to the temperature for 3-4 days before removal from tissue culture vessels. The roots were rinsed in water then planted in KU potting soil mixture in 4cm seedling trays. The seedling tray table was covered with removable clear plastic sheets to help maintain humidity.

The surviving plants were transferred to 12cm pots when they were approximately 6-10cm tall, and later to 20cm hanging baskets.

Figure 3. Plantlets in seed trays and 4-inch pots in the humidity table in lathe house

Results and discussion

Mutations were observed in flower color, flower form and growth habit. Some radiated plants had pink or very pale lavender petals and many had petals with streaked, mottled or variegated shades of purple. In some the edges of the petals were crinkled or erose. One sample had a bushier, compact growth habit. Aberrant flower forms with extra petals or missing petals were observed when the treated plants first bloomed but less frequently thereafter, so this may have been a physiological response to the tissue culture regimen rather than a genetic mutation. The samples with pink petals were chimeras with both pink and normal lavender blooms appearing on the same plant. This indicates that the mutation occurred in a specific area of tissue, probably a single cell in the LI II III layer.

Figure 4. Torenia flowers with color mutation

Figure 5. Torenia flowers with color mutation

Figure 6. Torenia flower with extra petal

Figure 7. Torenia flowers with erose petal margins

Figure 8. Torenia plant with compact growth habit

Figure 9. Torenia flower with variegated color

Table 2. Percentage of mutant plants from different treatments

Colchicine treatment	Gamma radiation dose (rads)	Rescued plants	Percent with variegated petals (%)	Percent with extra or missing petal (%)	Percent with flower color variation (%)
1ppm 48h	3,000	22	40.9	18.18	-
1ppm 72h	3,000	29	31.03	12.24	-
3ppm 48h	3,000	34	14.71	11.76	-
3ppm 72h	3,000	11	18.18	18.18	-
5ppm 48h	3,000	20	10.0	10.0	-
1ppm 48h	4,000	15	26.67	20.0	-
1ppm 72h	4,000	38	39.47	5.26	2.63
3ppm 48h	4,000	7	42.86	28.57	14.29
3ppm 72h	4,000	11	27.27	18.18	9.09
5ppm 48h	4,000	10	20.0	60.0	-

Acknowledgments

The author wishes to thank all the individuals at the National Genetic Engineering and Biotechnology Center (BIOTEC) and the Kasetsart University test fields who made this research possible.

Easily digested – font size

Customers stand 2-8 feet from your poster;

Title	80-96pt
Headings	36-54pt
Text	24-36pt
Captions	18-20pt

Use **bold** for title/headings only; *occasional* italics in text– and <u>no underlining!</u>

Easily digested – choice of font

Good for Posters

E

- Sans Serif – no ‘tails’
- Arial/Helvetica, Gill Sans, Calibri

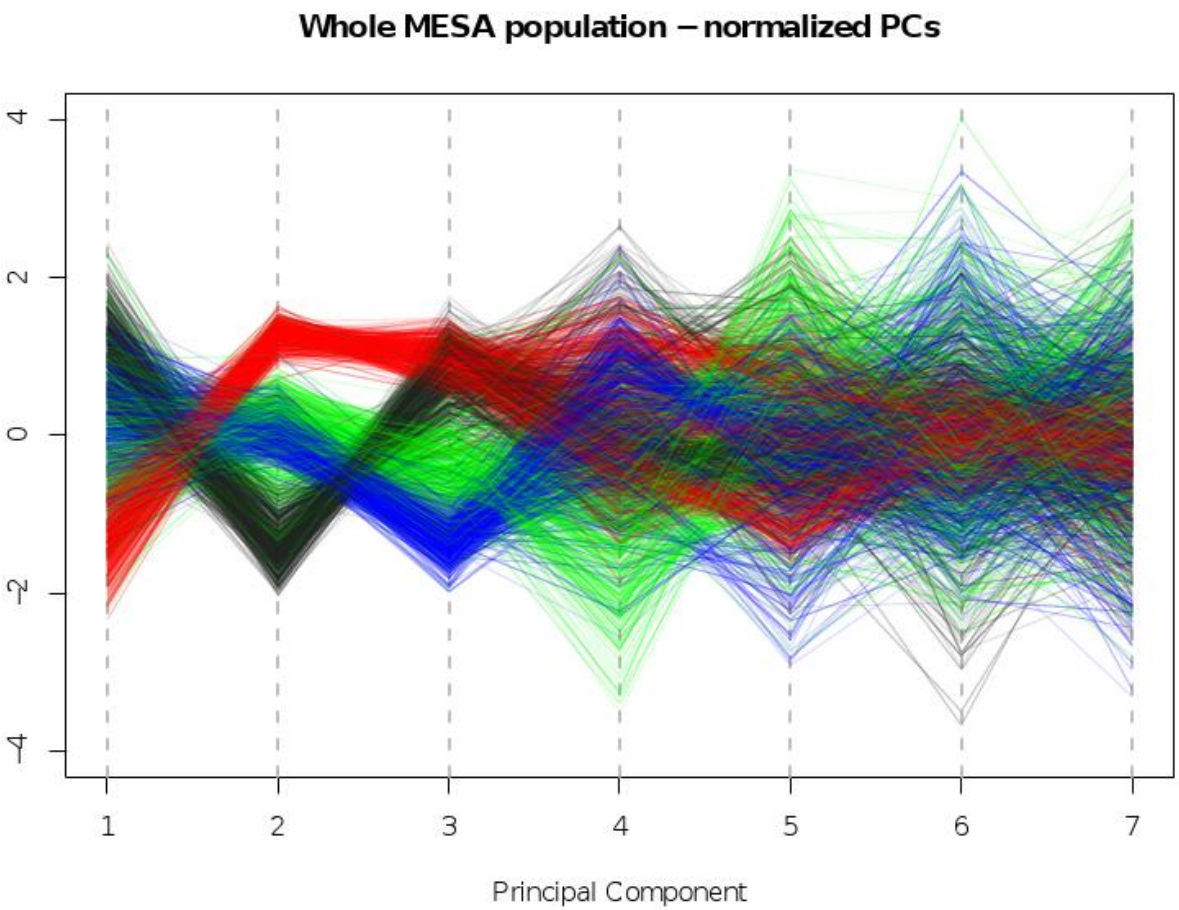
Good for Documents

E

- Serif – ‘tails’
- Times, Courier, Garamond

Easily digested – use pictures

See ‘How To Graph’ session…



Easily digested – use pictures

Make your graphs big enough;

- If it's important, make it one column wide
- For small multiples, use e.g. coplot()
- Make your graph in R *at full size*
- Get used to saving/re-running graphics code

Application-specific photos can also captivate – make sure you have >150dpi *at the printed size*

Easily digested – use lean text

‘Too much text’ is the classic mistake; remember 99% of the audience will only *scan* your poster

- Use pictures where possible
- Think what you *must* communicate in text
- Write nothing else

This is not easy! Edit your text, many times…

Easily digested – use lean text

Fat Text

Attempts by the author to make inference from the NASA data were fruitless until a 2−foot by 4−foot draft of this poster was printed. Only then were complicated investigations of the data possible. Computer monitors, with their low−resolution displays, cannot match up. At 300dpi, one side of a 4−inch by 6−inch notecard holds over two million pixels, even allowing for a quarter−inch margin on all sides. A 1280x1024 computer screen contains approximately 1.3 million pixels. The 4x6 card carries well over 50% more pixels, and hence more information, than the computer display. And that's just at 300dpi.

Lean text

Enough resolution?

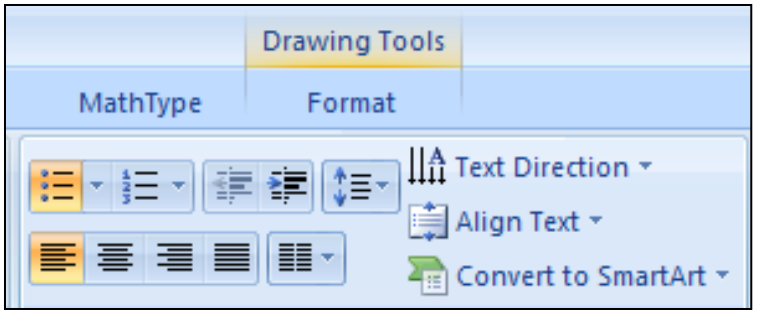
- Laptop screen = 1.3M pixels
- 4’ x 6’ card = 2M pixels, at 300 dpi
- More dots = more data

NB your *eye* has only about 2M pixels!

Easily digested – bulleting

PowerPoint likes to bullet everything;

- This is okay, on a poster;
  - Levels of bullets are available
    - Default text is smaller for higher-level bullets
- Learn how to Increase/Decrease list levels (right);



- PowerPoint's default line-spacing is not awful

Easily digested – math

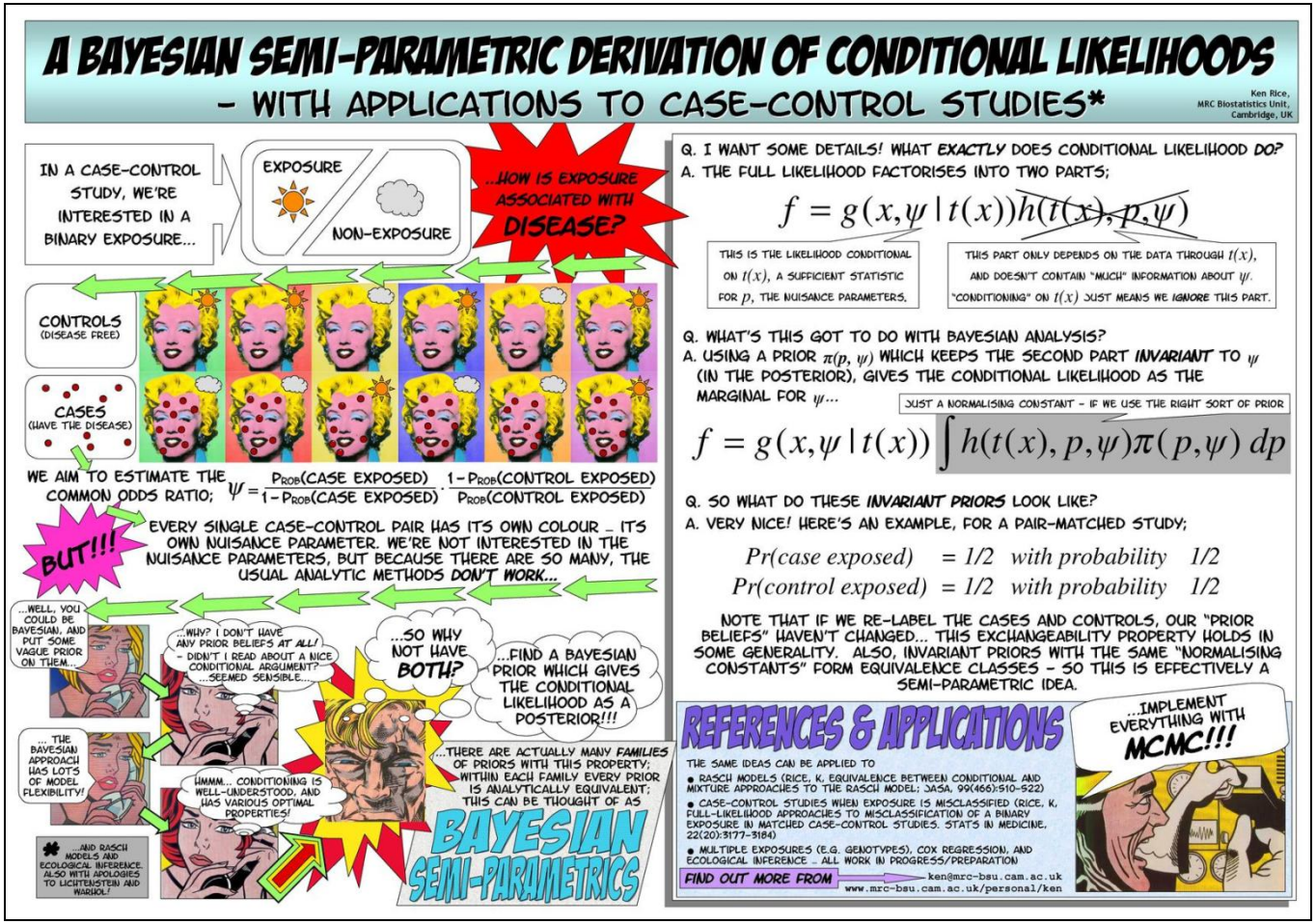
Displaymath takes some work in PowerPoint

$$f(y;\mu,\sigma) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(y-\mu)^2}{2\sigma^2}}$$

- Insert/Equation – or old ‘MathType’ add-in
- Slow, un-wonderful results, too-small defaults
- Very hard to fine-tune – plan what you’ll need
- Some LaTeX shortcuts exist
- Use math sparingly – it’s hard to absorb

Easily digested – math

‘Pretty’ math may not be your biggest problem;



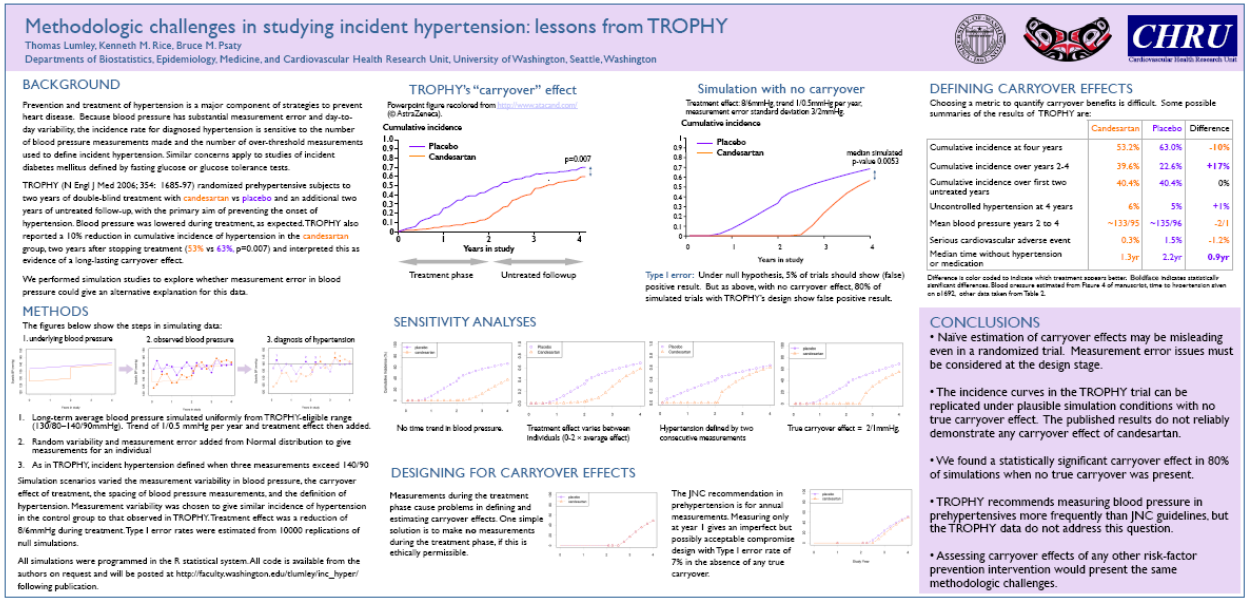
Attractive

After making your poster intelligible, it helps to make it appealing to passing customers;

- Color scheme
- Picture resolution
- Smile!

Attractive – color scheme

- Easy reading requires light/dark contrast
  - dark text on light background
  - color for highlighting
  - bright colors used sparingly.



Methodologic challenges in studying incident hypertension: lessons from TROPHY

Thomas Lumley, Kenneth M. Rice, Bruce M. Psaty

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BACKGROUND

Prevention and treatment of hypertension is a major component of strategies to prevent heart disease. Because blood pressure has substantial measurement error and day-to-day variability, the incidence rate for diagnosed hypertension is sensitive to the number of blood pressure measurements made and the number of over-threshold measurements used to define incident hypertension. Similar concerns apply to studies of incident diabetes mellitus defined by fasting glucose or glucose tolerance tests.

TROPHY (N Engl J Med 2006; 354: 1685-97) randomized prehypertensive subjects to two years of double-blind treatment with candesartan vs placebo and an additional two years of untreated follow-up, with the primary aim of preventing the onset of hypertension. Blood pressure was lowered during treatment, as expected. TROPHY also reported a 10% reduction in cumulative incidence of hypertension in the candesartan group, two years after stopping treatment (53% vs 63%, p=0.007) and interpreted this as evidence of a long-lasting carryover effect.

We performed simulation studies to explore whether measurement error in blood pressure could give an alternative explanation for this data.

METHODS

The figures below show the steps in simulating data:

1. underlying blood pressure
2. observed blood pressure
3. diagnosis of hypertension

1. Long-term average blood pressure simulated uniformly from TROPHY-eligible range (130/80–140/90mmHg). Trend of 1/0.5 mmHg per year and treatment effect then added.
2. Random variability and measurement error added from Normal distribution to give measurements for an individual
3. As in TROPHY, incident hypertension defined when three measurements exceed 140/90

Simulation scenarios varied the measurement variability in blood pressure, the carryover effect of treatment, the spacing of blood pressure measurements, and the definition of hypertension. Measurement variability was chosen to give similar incidence of hypertension in the control group to that observed in TROPHY. Treatment effect was a reduction of 8/6mmHg during treatment. Type I error rates were estimated from 10000 replications of null simulations.

All simulations were programmed in the R statistical system. All code is available from the authors on request and will be posted at http://faculty.washington.edu/tlumley/inc_hyper/ following publication.

TROPHY's "carryover" effect

Powerpoint figure recolored from http://www.atacand.com/ (© AstraZeneca).

Cumulative incidence

Placebo
Candesartan
p=0.007

Years in study

Treatment phase | Untreated followup

Simulation with no carryover

Treatment effect 8/6mmHg, trend 1/0.5mmHg per year, measurement error standard deviation 3/2mmHg.

Cumulative incidence

Placebo
Candesartan
median simulated p-value 0.0053

Years in study

Type I error: Under null hypothesis, 5% of trials should show (false) positive result. But as above, with no carryover effect, 80% of simulated trials with TROPHY's design show false positive result.

SENSITIVITY ANALYSES

No time trend in blood pressure.

Treatment effect varies between individuals (0-2 × average effect)

Hypertension defined by two consecutive measurements

True carryover effect = 2/1mmHg.

DESIGNING FOR CARRYOVER EFFECTS

Measurements during the treatment phase cause problems in defining and estimating carryover effects. One simple solution is to make no measurements during the treatment phase, if this is ethically permissible.

The JNC recommendation in prehypertension is for annual measurements. Measuring only at year 1 gives an imperfect but possibly acceptable compromise design with Type I error rate of 7% in the absence of any true carryover.

DEFINING CARRYOVER EFFECTS

Choosing a metric to quantify carryover benefits is difficult. Some possible summaries of the results of TROPHY are:

	Candesartan	Placebo	Difference
Cumulative incidence at four years	53.2%	63.0%	-10%
Cumulative incidence over years 2-4	39.6%	22.6%	+17%
Cumulative incidence over first two untreated years	40.4%	40.4%	0%
Uncontrolled hypertension at 4 years	6%	5%	+1%
Mean blood pressure years 2 to 4	~133/95	~135/96	-2/1
Serious cardiovascular adverse event	0.3%	1.5%	-1.2%
Median time without hypertension or medication	1.3yr	2.2yr	0.9yr

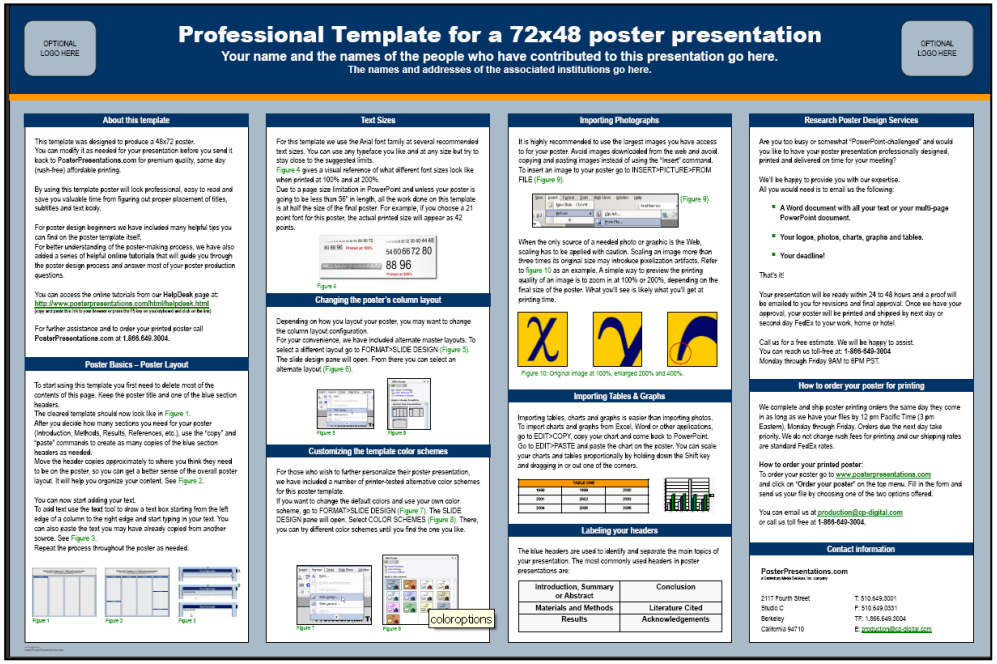
Difference is color coded to indicate which treatment appears better. Boldface indicates statistically significant differences. Blood pressure estimated from Figure 4 of manuscript, time to hypertension given on p1692, other data taken from Table 2.

CONCLUSIONS

- Naïve estimation of carryover effects may be misleading even in a randomized trial. Measurement error issues must be considered at the design stage.
- The incidence curves in the TROPHY trial can be replicated under plausible simulation conditions with no true carryover effect. The published results do not reliably demonstrate any carryover effect of candesartan.
- We found a statistically significant carryover effect in 80% of simulations when no true carryover was present.
- TROPHY recommends measuring blood pressure in prehypertensives more frequently than JNC guidelines, but the TROPHY data do not address this question.
- Assessing carryover effects of any other risk-factor prevention intervention would present the same methodologic challenges.

Attractive – color scheme

- Light text on dark background ok at large sizes
  - useful for titles
  - bad templates exist! (e.g. blue text on green)
- White panels on colored background makes flow more obvious;



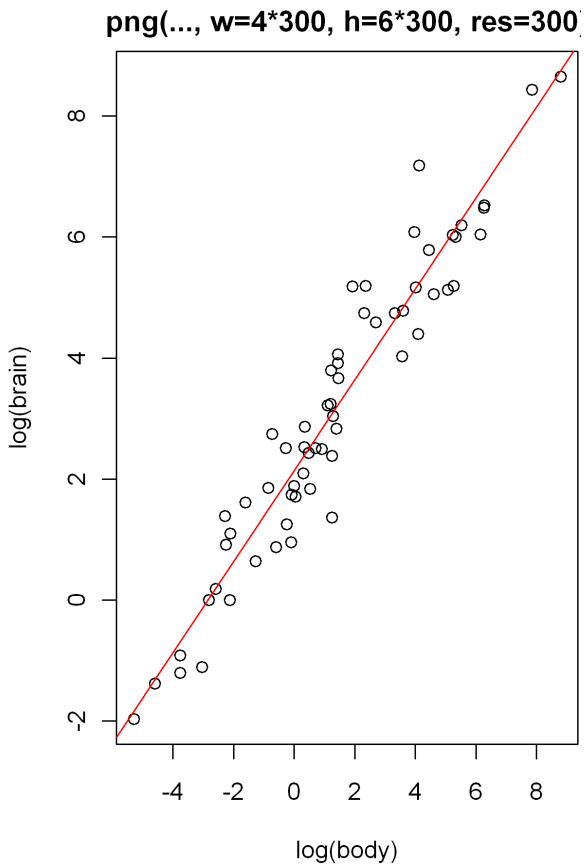
Attractive – picture resolution

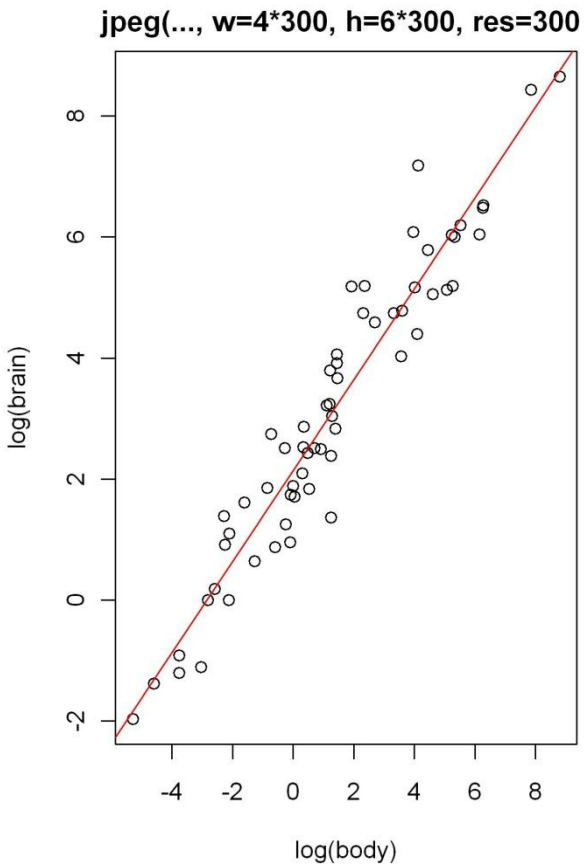
- Most statistical graphics can be in a ‘vector’ format with unlimited resolution
  - Windows metafile; use `win.metafile()`
  - PDF is a vector format, but default PowerPoint on a PC can’t handle it

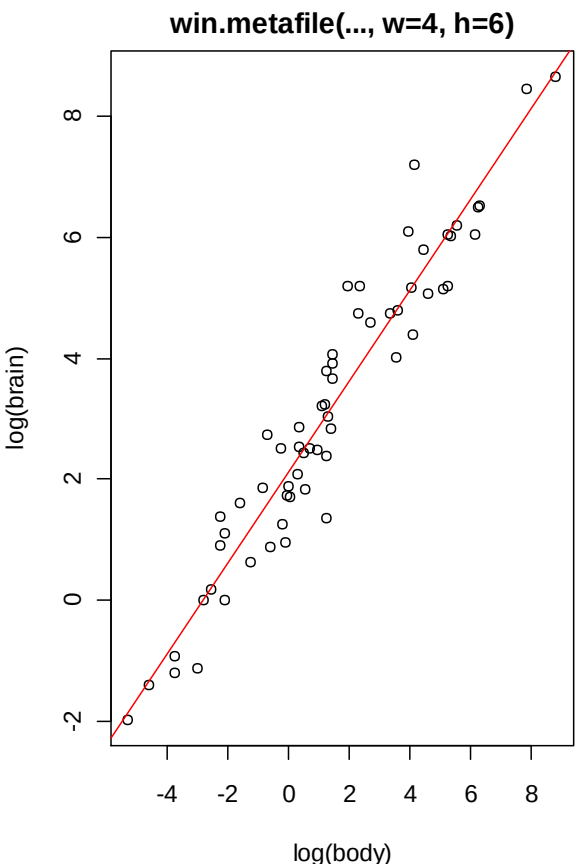
- Bitmaps should be roughly 300dpi *at final size*
  - PNG bitmaps are good for graphs with many points or lines (e.g. GWAS); use `png()`
  - JPEG bitmaps for photographs; use `jpeg()`

Attractive – picture resolution

Some examples (.wmf editable in PowerPoint)







Attractive – smile!

Before the poster session;

- Make sure your poster will be captivating
- Think what the main points are; try explaining them (and how awesome they are) to your friend/housemate/cat
- Make letter-size copies of your poster

Attractive – smile!

At the poster session;

- Turn up on time, stand beside your poster
- Wear a name badge
- Smile! Greet passers-by, make eye contact
- Be enthusiastic – point out e.g. relevant graphs
- Distribute letter-size copies of your poster
- Leave a ‘back in 5 mins’ post-it, when you must

Attractive – smile!

If there's a 'trying too hard' award…

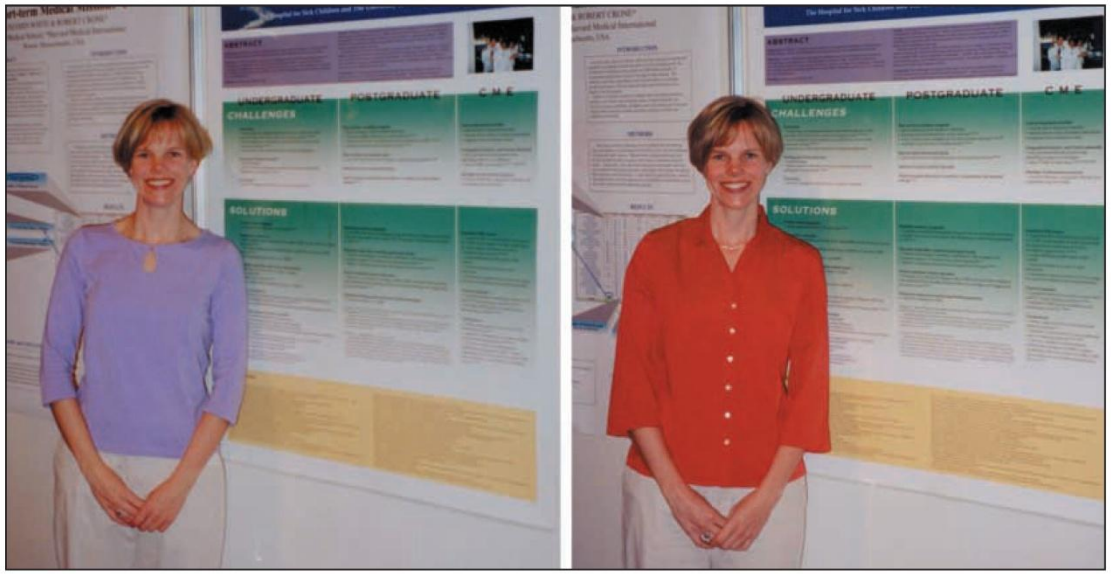


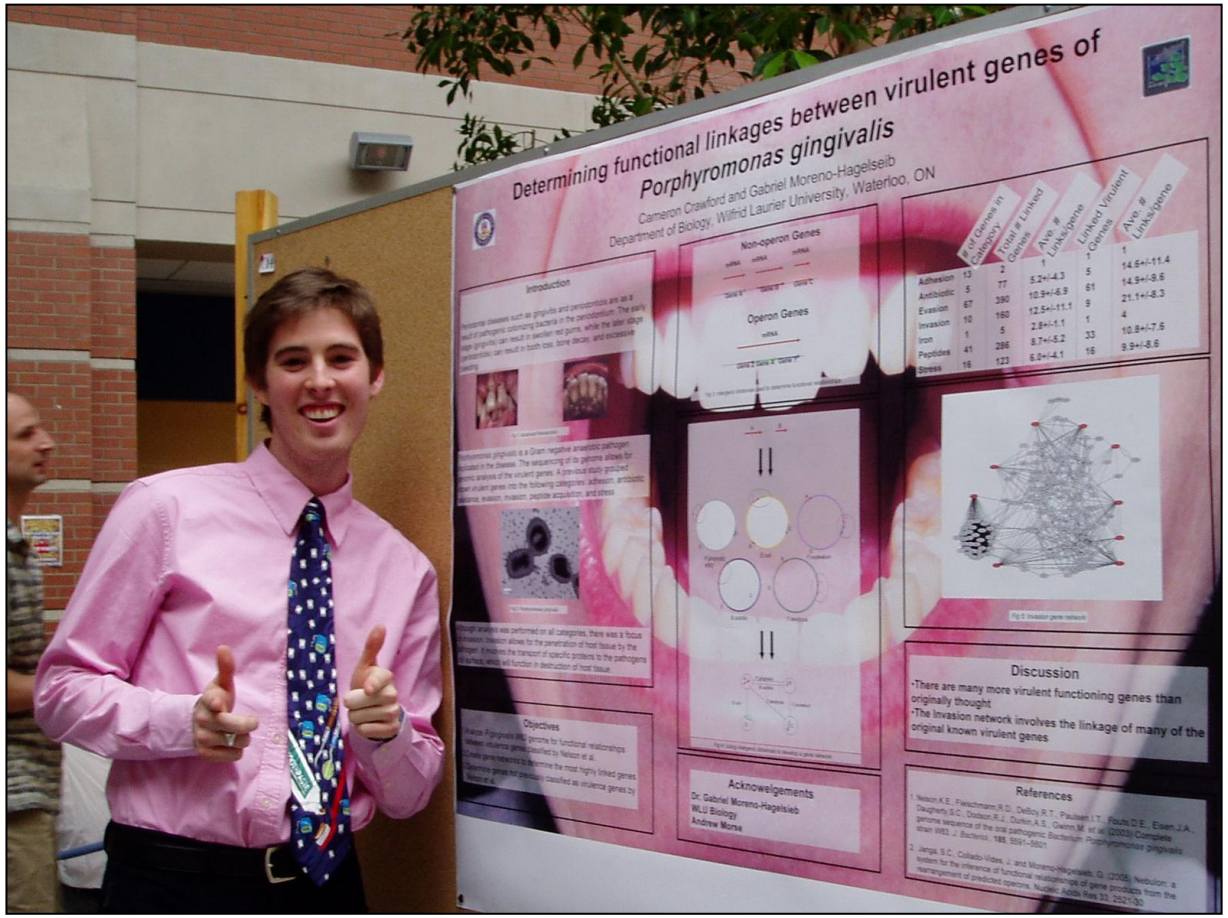
Fig. 1: Study presenter in lavender-coloured blouse (chosen to coordinate with poster colour) and in rust-coloured blouse (chosen to clash with poster).

Fig. 2: Control presenter, in neutral-coloured attire.

Keegan, D.A., and S.L. Bannister. 2003. Effect of colour coordination of attire with poster presentation on poster popularity. *Canadian Medical Association Journal* 169:1291-1292

Attractive – smile!

… and don't smile *this* much;



Final Nuts and Bolts

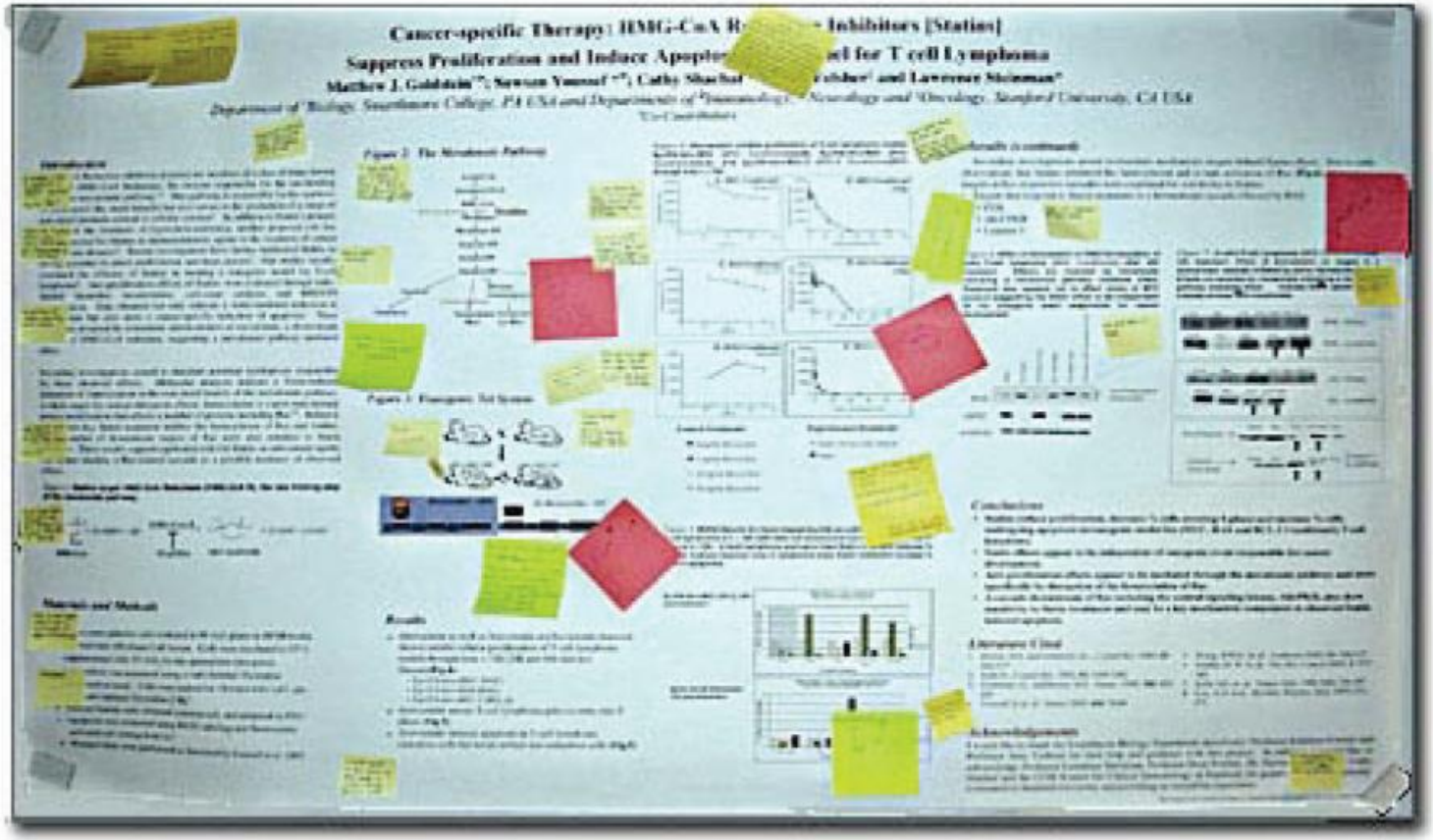
- Printing (draft)
- Editing
- Printing (final)

Final Nuts and Bolts

- Draft versions can be printed at letter size
  - text should be legible, flow should be clear
- Cut-and-paste into Excel for multipage draft
  - some assembly required

Final Nuts and Bolts

Once printed, edit – and get input from others;



Final Nuts and Bolts

- UW posters is on 2nd floor, T-wing
- Printing takes 24 hours
- They offer 'proof' copies to check colors ($7) or just layout ($5)
  - Biostat isn't paying for these
- Take your PowerPoint file on a thumb drive or upload at http://depts.washington.edu/uwposter
- Pay by budget number (or 15% surcharge)

Final Nuts and Bolts

Some breaking news;

- Biostat computers will be down the weekend before the retreat
- Recall: printing takes 24 hrs
- You *and your poster* must leave Seattle for Leavenworth early on Tues 9/20

At the latest, submit your poster on Thurs 9/15

Final Nuts and Bolts

At conferences, making a good poster is key to meeting smart senior people, and making your name as a statistician

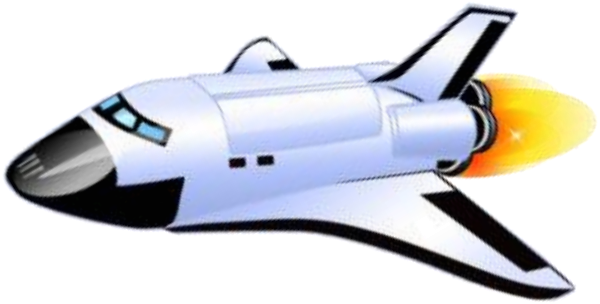
Meantime… you can win (non-trivial) prizes;

- Best poster
- Sub-categories; as voted by students, faculty, new first-years, etc

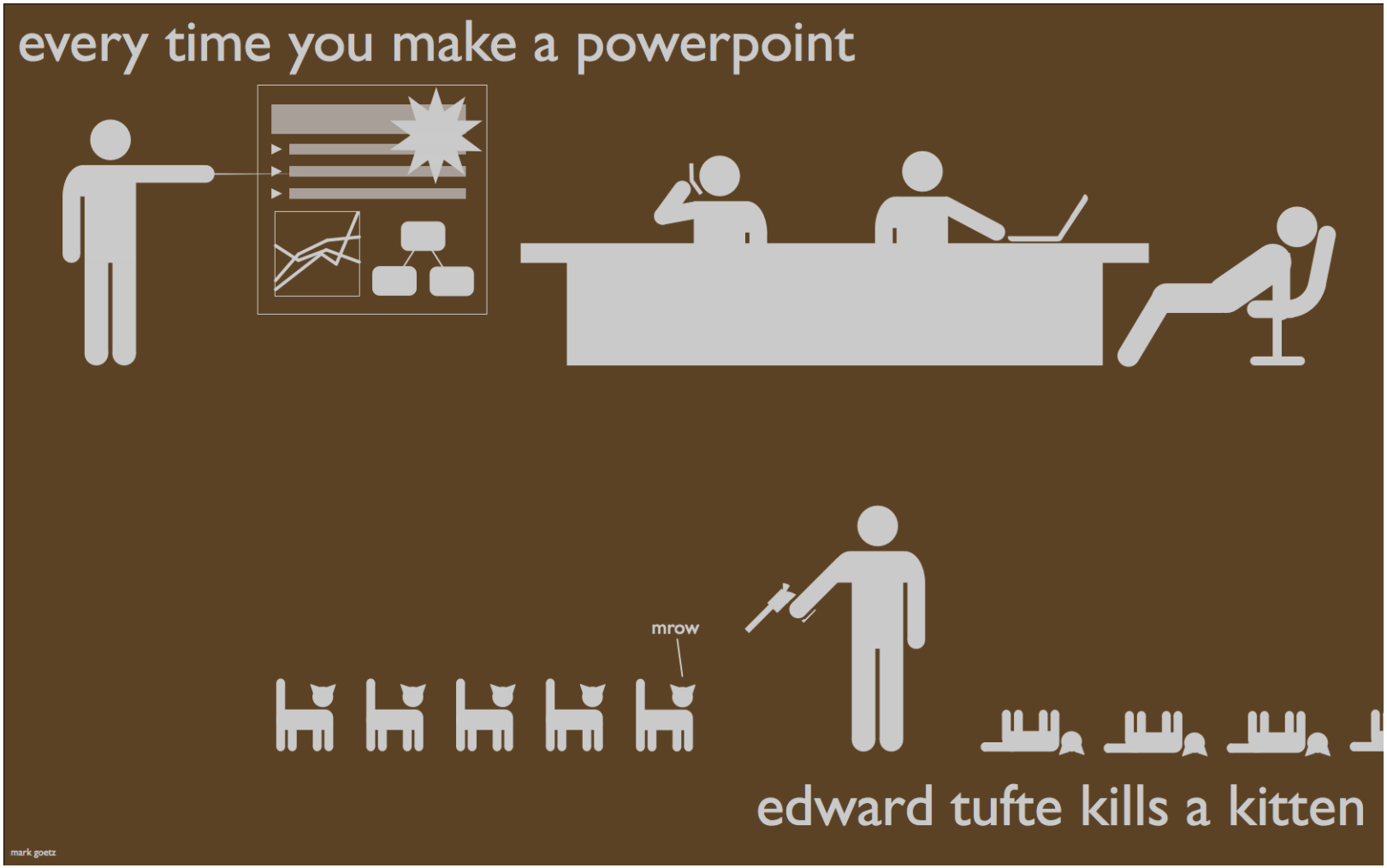
Not getting carried away

Recall Tufte's "chartjunk"; avoid posterjunk

- No silly fonts
- No space-filling clip art;



- No WordArt

These are all very tempting, but remember…

Not getting carried away