BMES
BIOMEDICAL ENGINEERING SOCIETY™

How to Prepare an Effective Poster Presentation

February 27, 2013
3:00 PM ET

Announcements

- Presentation slides and archived audio recording will be available a few days after the webinar at: http://bmes.org/elearning
- You may submit questions throughout by using the online chat function
- Questions will be addressed at the end
- Please take a few minutes to complete the brief survey following the webinar to provide feedback

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Polling Questions

- Which of the following best describes you?
  - Undergraduate student
  - Graduate student
  - Early career professional
  - Faculty
  - Other

- Have you ever presented a poster before?
  - Yes
  - No

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BMES webinar #1:

How to Prepare an Effective Poster Presentation

Part I: **anatomy of a poster**

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BMES

February 27, 2013 - 3:00pm ET

Anatomy: the nuts and bolts

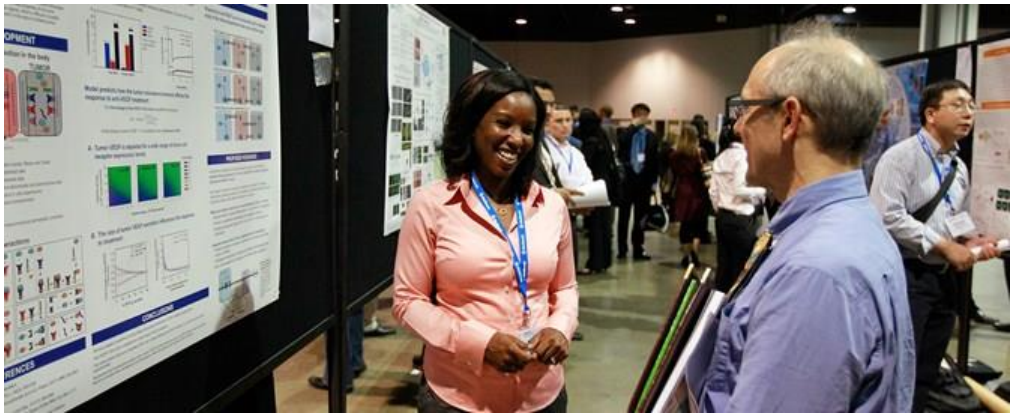
1. Assess – audience and your motivation
2. Assemble content
   - like any presentation or paper
3. Organize your information - simplify
   - Identify important message, supporting info
   - Develop flow, minimize text
4. Design visuals
   - Text types and sizes
   - Do's and don'ts for graphics
5. Assemble the poster
   - General best practices

BMES 2011 Annual Report

Assess… to guide decisions

Focus of Part 2

- Target audience and time they'll spend?
  - Lay person?
  - Scholar from a your field or different field?
  - Student paper competition?

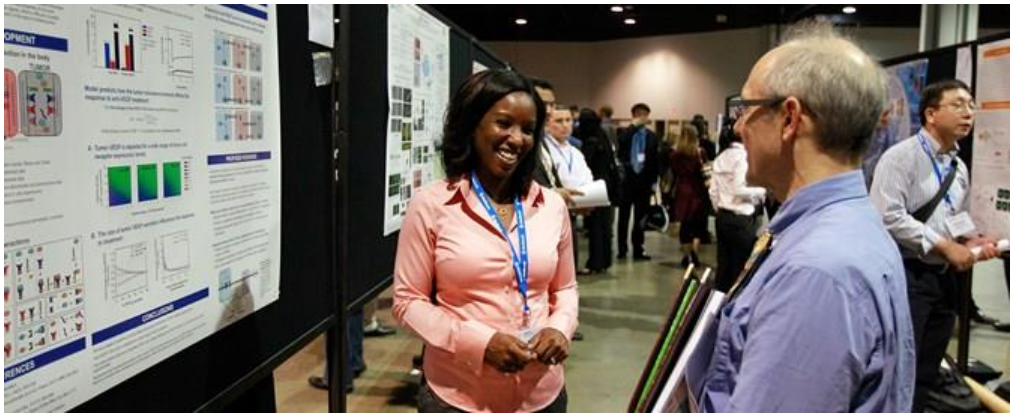


http://bmes.org/

Assess… to guide decisions

Focus of Part 2

- Target audience and time they'll spend?
  - Lay person?
  - Scholar from a your field or different field?
  - Student paper competition?
- Your motivation?
  - Inform?
  - Persuade?
  - Establish yourself or compete?



http://bmes.org/

Assemble content

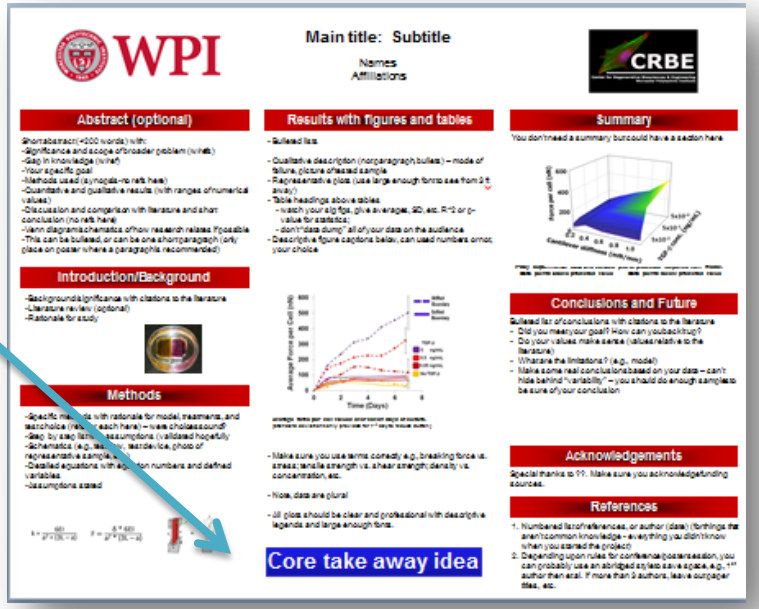
- Effective title - professional tone
- List coauthors & institutional affiliations (w/logos)
- Abstract – optional (next slide)
- Introduction - background and goal (highlighted)
- Materials & Methods
- Results – quantitative and qualitative - graphical
- Discussion, conclusions, future
- Acknowledgments (esp. funding)
- References – can use abridged style

Abstract (optional)

1. Significance and scope of broader problem
2. Gap in knowledge
3. Your specific goal/hypothesis (to fill gap)
4. Methods used (general approach/synopsis)
5. Qualitative & quantitative results (ranges and/or mean ± SD, stats if possible)
6. Discussion with comparison with literature and short conclusion (don’t forget concl)

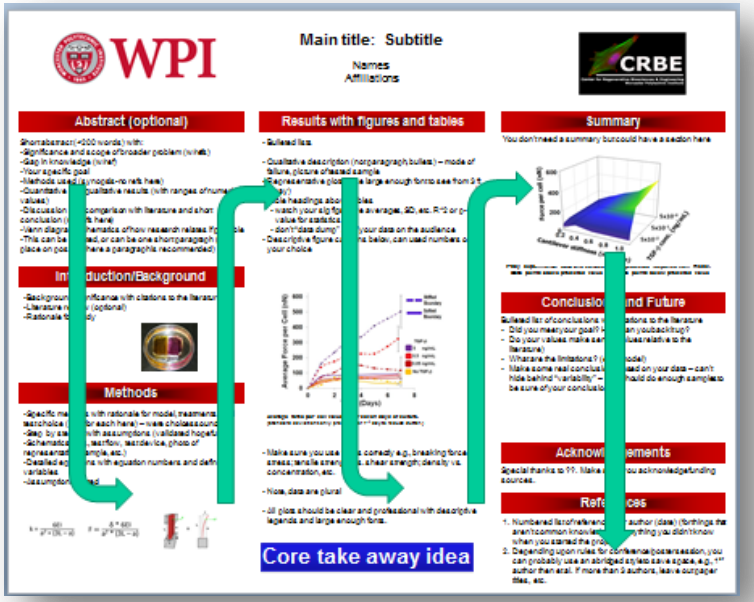
Organize info - simplify

- Space is limited, what's **most** important?
  - It's a presentation – not stand alone document
- Take-away message
  - **One** core idea - Not details
  - Key supporting information?



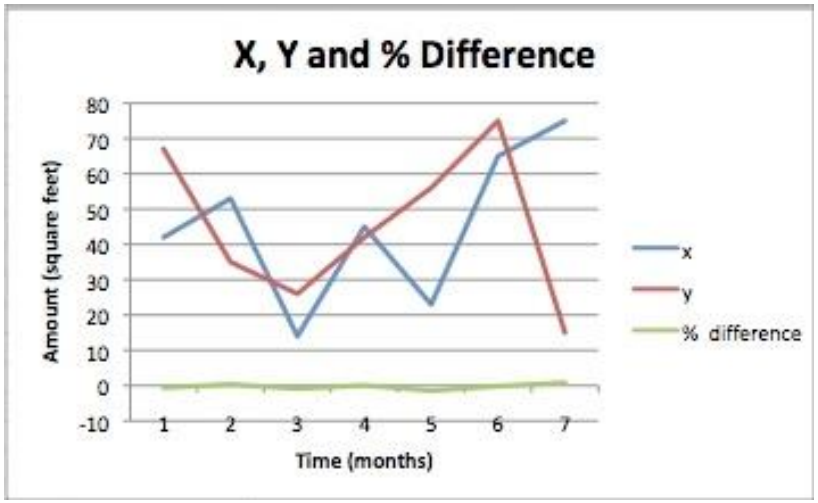
Organize info - simplify

- Space is limited, what's **most** important?
  - It's a presentation – not stand alone document
- Take-away message
  - **One** core idea - Not details
  - Key supporting information?
- Bullets, no paragraphs
  - shoot for 7 entries max
  - group concepts
- Visual flow
  - Direct the reader - left-right, arrows, and/or numbers
  - Start with 3 columns, but don't be constrained



Design visuals – do's and don'ts

- Less text, more figures
  - Images, charts, graphs, timelines, and diagrams
  - Avoid tables (graph the data)



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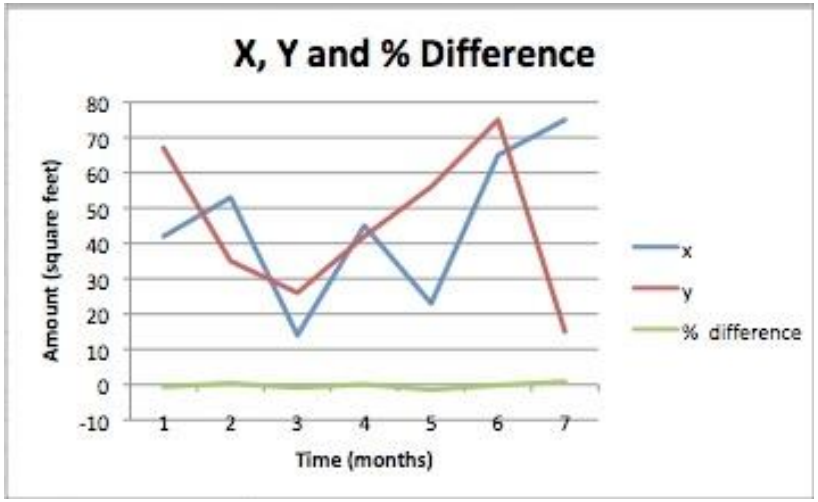
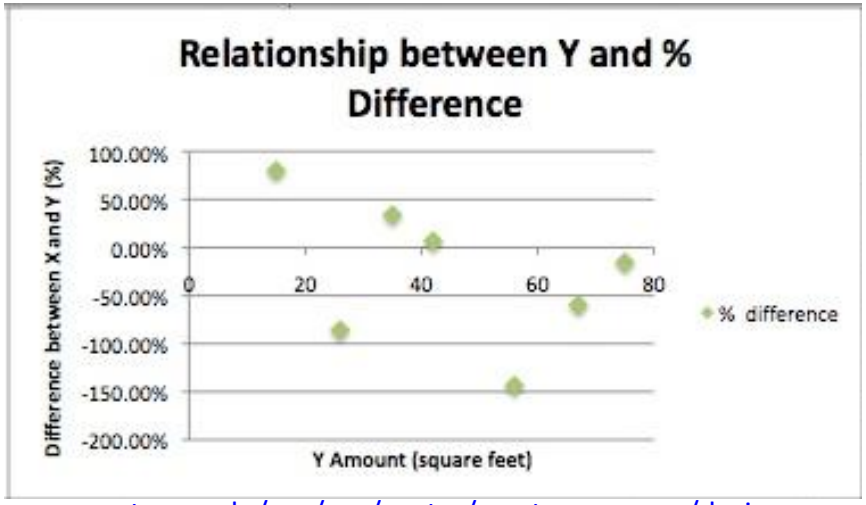




utexas.edu/ugs/our/poster/create_message/design

  - Use consistent colors (as above, but need contrast)
  - Caption below, not titles (NOT as above)
  - Cross lines only when necessary, sig figs!

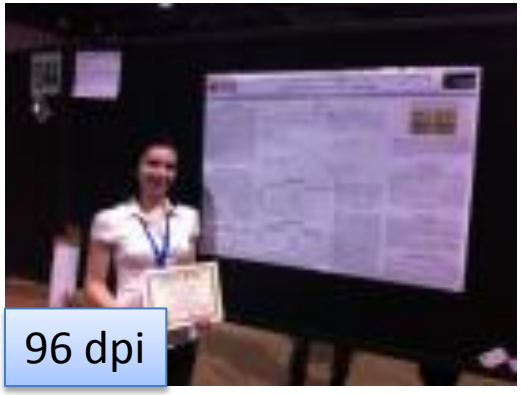
Sig figs

- Use proper significant figures
- Highlight important comparisons - differences, changes, and trends – not specific numbers

Source: Saturday Morning Breakfast Cereal

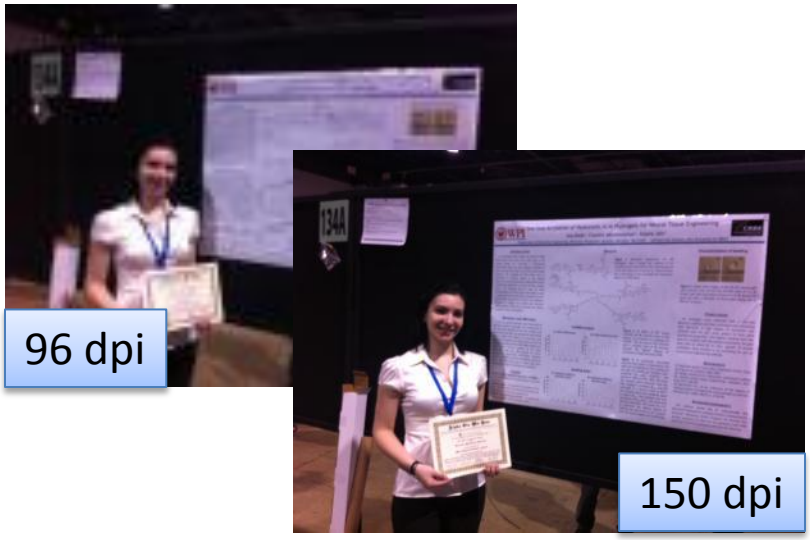
Design visuals – specifics

- Entering graphs/plots
  - I generally paste picture (JPG or PNG, not TIFF) from Excel or similar - avoids resizing issues and linked files
  - No background instead of white



Design visuals – specifics

- Entering graphs/plots
  - I generally paste picture (JPG or PNG, not TIFF) from Excel or similar - avoids resizing issues and linked files
  - No background instead of white
- Photos
  - 150 dpi (or even 300 dpi)
  - or line art/emf



Axes and fonts

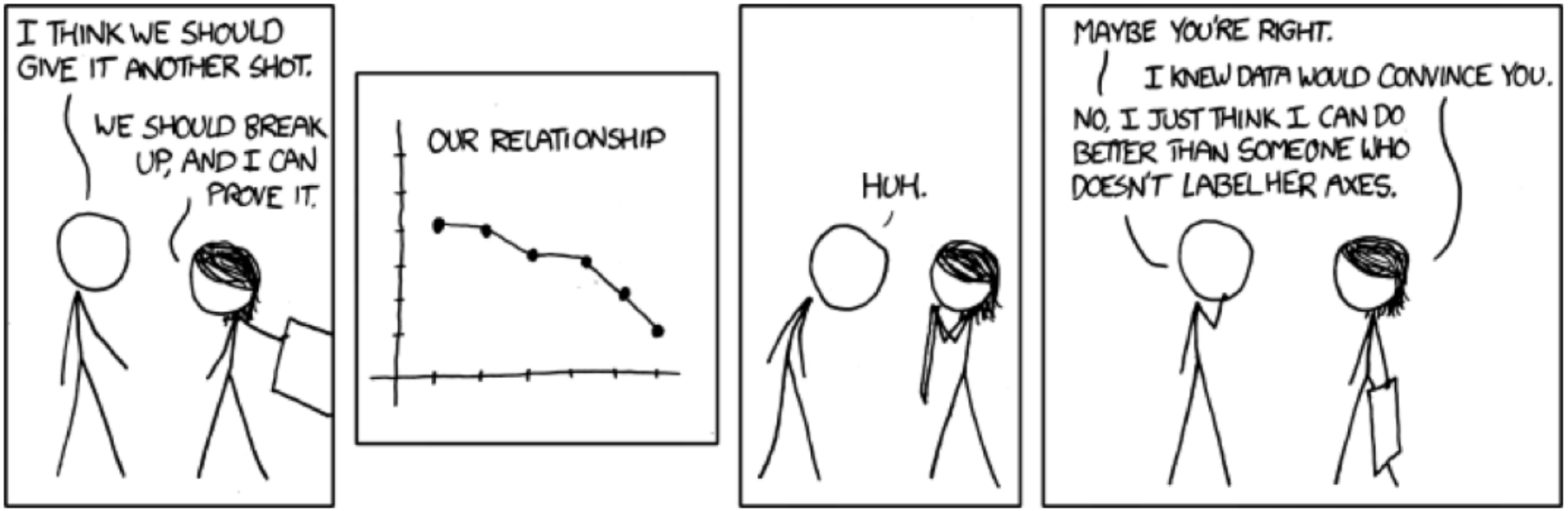


Image Source: XKCD

Axes and fonts

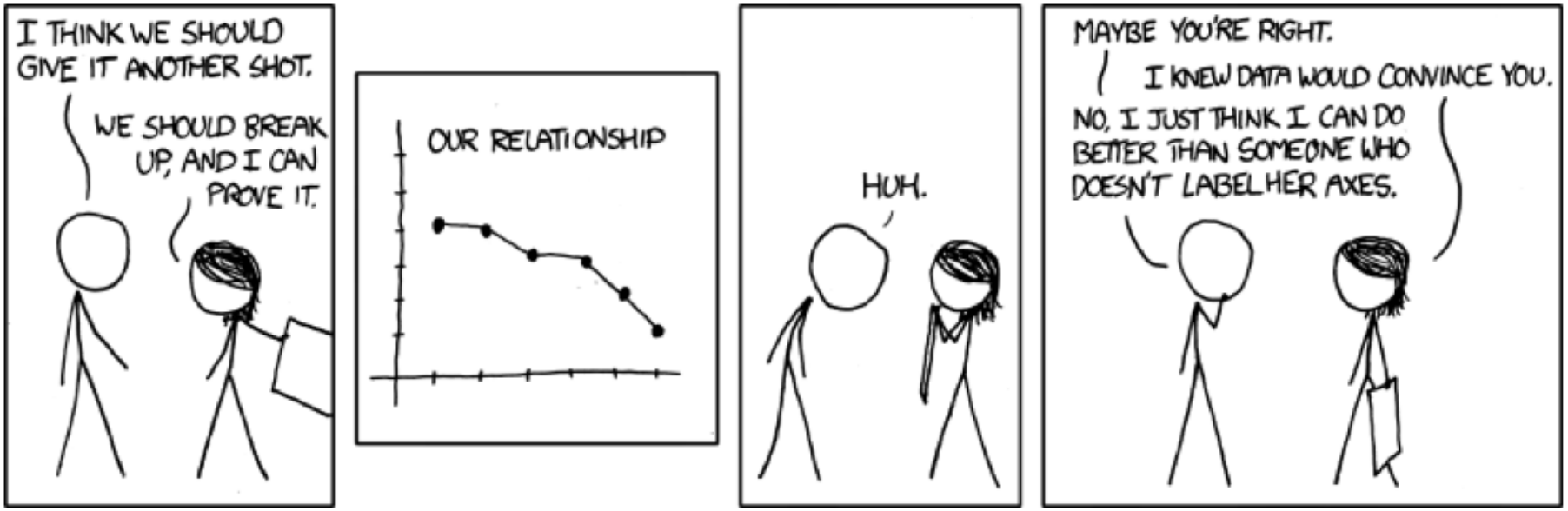
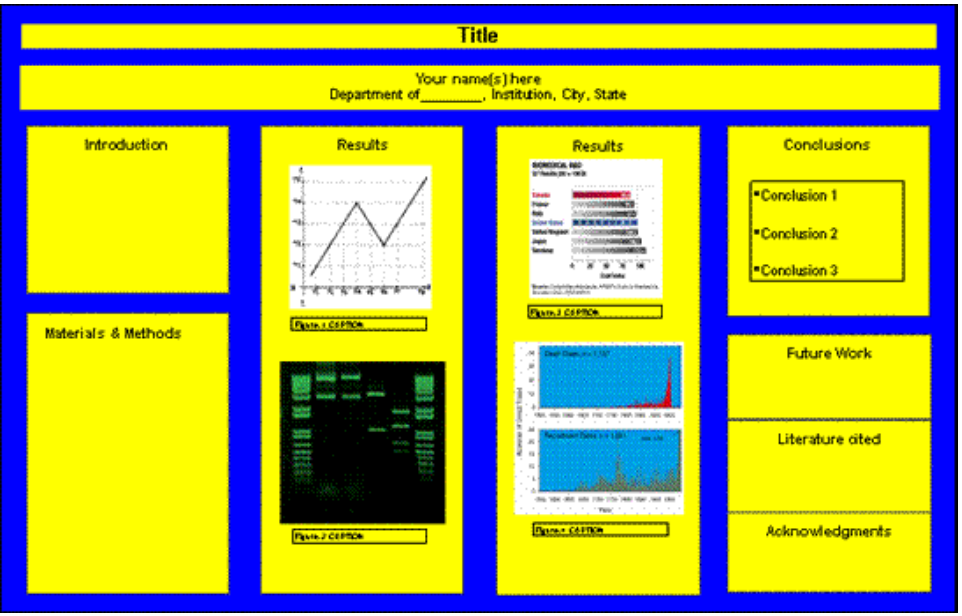


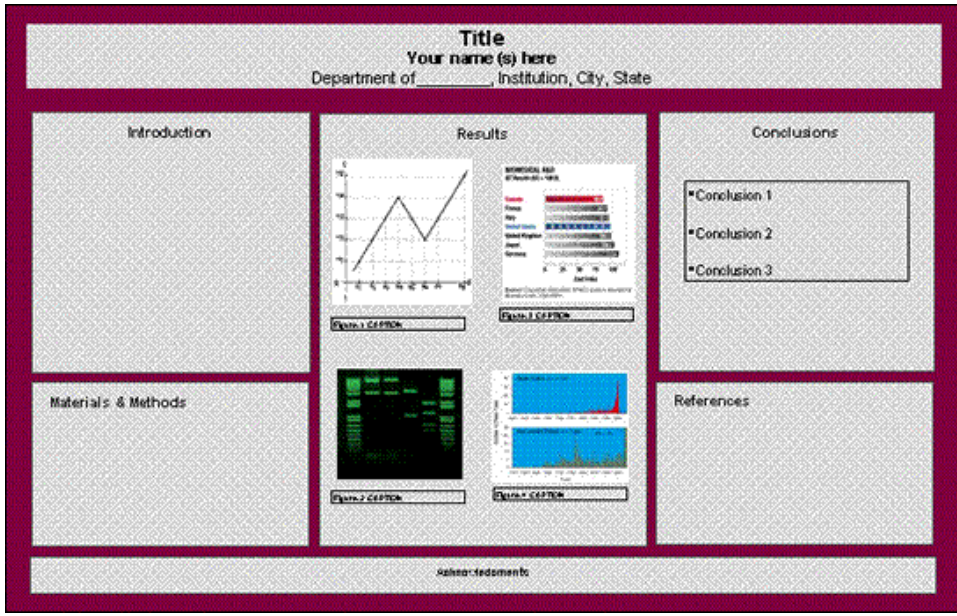
Image Source: XKCD

- Use proper axes
- Use large enough font to see from 3 feet
- Sans serif (Arial) rather than serif (Times)
- Comedy only if relevant…

Colors



A

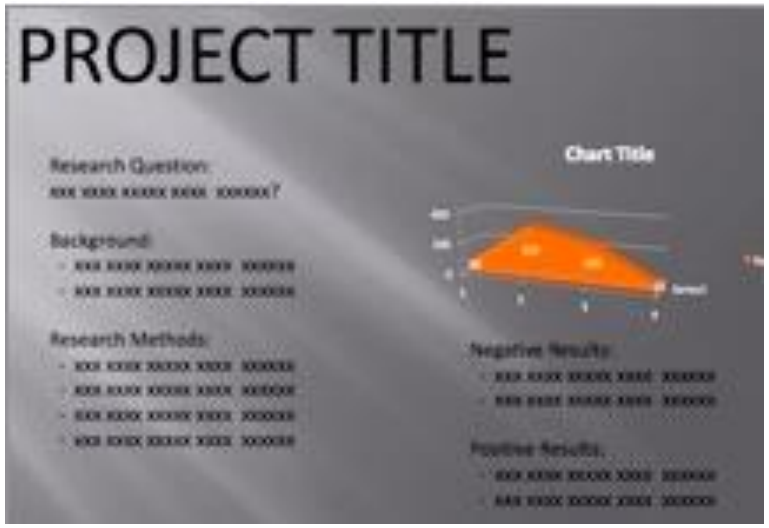


B

http://ppop.stanford.edu/posters.html

Poll: Which poster would you like to read? A, or B?

Colors - background



A

utexas.edu/ugs/our/poster/create_message/design

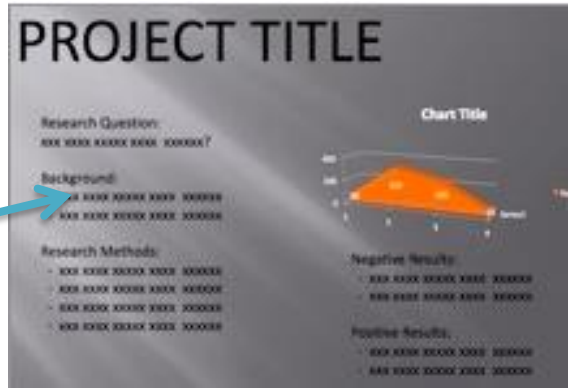
B

Poll: Which poster would you like to read? A, or B?

Open comments: Are there any suggestions for improvements?

Background and colors

- Background
  - Check your university/lab for template
  - Color costs more to print
    - Hard to read dark on dark



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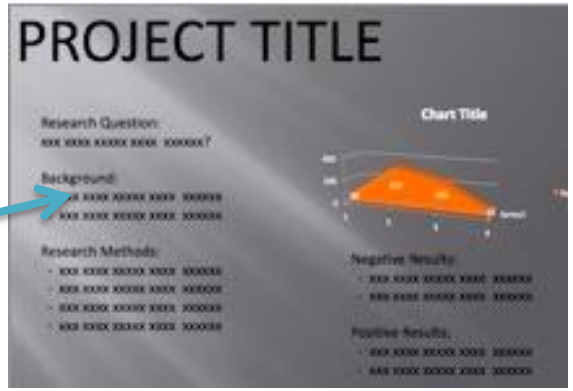
Background and colors

- Background
  - Check your university/lab for template
  - Color costs more to print
    - Hard to read dark on dark
  - Picture background – expert
    - Obscures graph details
    - Red on green
- Colors
  - Don’t clash, but use contrast
    - no red on black or yellow on white
  - Be cognizant color blind (red/green)
  - I suggest dark text on light background



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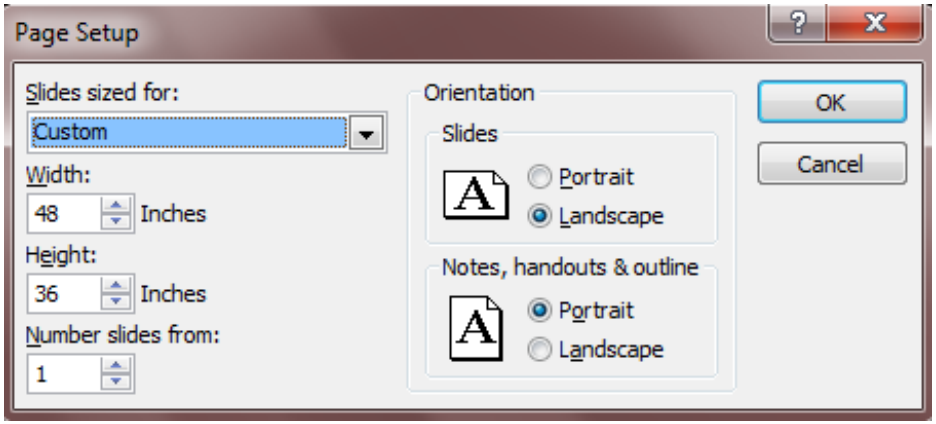
Assembling the poster

- Size and format
  - Generally landscape
  - In Powerpoint: Design\Page Setup



  - Don't need to fill entire poster board
    - e.g., 4'x8' is VERY big

Assembling (cont)

- White space – not enough --->
  - Divide sections w/ empty space

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Assembling (cont)

- White space – not enough --->
  - Divide sections w/ empty space

utexas.edu/ugs/our/poster/create_message/design

- Printing
  - Printing individual slides - not advised
  - Send PPT and PDF to campus printing service (~$30-$50)
  - Kinkos/Fedex ~ $8/sq. ft. (start at ~$50)
  - Compress pictures - size of files < 5 MB if possible

Chicken Femur Model of Osteoporotic Bone

Student Names
BME3504, Group 4, B-Ter
Biomedical Engineering Department, Worcester Polyt

Illegible figure text

Abstract

Over 1.5 million bone fractures each year in the U.S. are attributed to osteoporosis. Osteoporosis is a skeletal disorder that causes bones to break down faster than they are formed [1]. Fractured osteoporotic bones (OB) are difficult to fixate. Comparative testing is necessary to determine a plating system that best fixates fractured OB; however, cadaveric OB vary too greatly to use for comparison [2]. The goal of this study was to develop a biomechanically sound model of OB to be used in the comparison of fracture fixation plating systems. To be considered osteoporotic, the model must have 81.3% the ultimate tensile strength (UTS) of normal bone (NB) [3]. Chicken femurs were separated into 4 groups; a control group and 3 experimental groups. Each experimental group was treated in 0.6M hydrochloric acid (HCl) for different set periods of time [4]. Three-point bending tests were conducted on the bones to compare the mechanical properties of each group [3]. From initial testing, it was predicted that the bones would reach osteoporotic UTS after being treated for 33 minutes. After final testing, it was determined that it would take 37 minutes for the bones to reach osteoporotic UTS in 0.6M HCl. Chicken femurs treated in HCl were found to make a model of OB that can be easily reproduced for the comparison of fracture fixation plating systems.

Methods

- Chicken femoral bones were used as models – they have similar micro-structural characteristics to human bones [5].
- The bones were treated in 0.6M HCl baths for varying increments of time between 0 and 6 hours.
- Three-point bending tests were conducted on the bones with a loading rate of 0.1mm/sec [2].

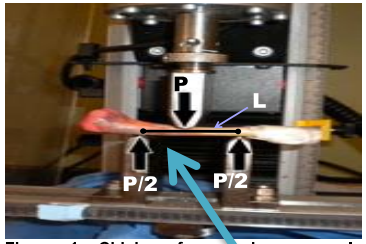
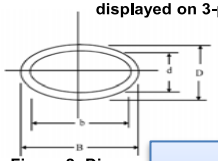


Figure 1: Chicken femoral bone sample displayed on 3-point bending apparatus.



E=(P/V)[L³/(48*I)] (Eqn.1)
I (Inertia)=(π/64)(D⁴ – bd³) (Eqn.2)
P/V=slope of force-displacement (Eqn.3)
M (Moment)=(P_{max}*L)/4 (Eqn.4)
UTS=(M*D/2)/I (Eqn.5)

Figure 2: Diagram section of bone [6

Nice schematics over photo

- Initial testing was con
the time that the mod
- Equations 1-5 were u
- The resultant mean
mean UTS for the co
- The mean UTS for e
determine a smaller range of times to treat the bones.
  - From the analysis of the initial tests, new times of 0, 30, 60, and 90 minutes were chosen.
  - The UTS of the chicken femur as found in literature was 96MPa [7]. If the control bones show similar UTS properties to those in literature, to be considered osteoporotic, 81.3% of NB UTS, the bones should exhibit a UTS of 78.0MPa [3].

Results

Table 1: Compilation of the measurements and the calculations for each bone tested in the control group and the 3 experimental groups treated for 30, 60, and 90 minutes.

Group	Specimen	L (m.)	D (mm)	d (mm)	B (mm)	b (mm)	F_{max} (N)	M_{max} (N*m)	P/V (N/m)	I (m^4)	Stiffness (GPa)	UTS (MPa)
Control	1	3.85E-02	11.06	7.99	9.43	6.85	431.76	4.16	3.80E+05	3.29E-10	1.37	59.52
	2	3.85E-02	9.25	7.85	6.25	4.24	221.02	2.13	1.98E+05	8.13E-11	2.89	81.73
	3	3.85E-02	9.97	7.84	7.90	4.13	365.12	3.51	2.46E+05	2.14E-10	1.37	64.81
	4	4.48E-02	9.54	7.55	7.37	4.30	272.40	3.05	2.20E+05	1.58E-10	2.61	71.19
	5	4.48E-02	8.70	6.72	6.95	4.18	315.56	3.53	1.82E+05	1.19E-10	2.86	102.97
	6	4.48E-02	8.28	5.43	8.45	5.68	277.82	3.11	1.94E+05	1.96E-10	1.85	66.94
	7	4.48E-02	10.23	6.79	7.93	4.46	456.17	5.11	3.18E+05	2.21E-10	2.70	91.73
	mean	4.21E-02	9.57	7.17	7.75	4.83	334.27	3.51	2.48E+05	1.88E-10	2.24	76.98
	SD	3.37E-03	0.94	0.92	1.03	1.04	87.09	0.94	7.40E+04	8.04E-11	0.69	15.83
30 min.	1	3.85E-02	8.73	6.84	5.96	3.20	191.88	1.85	1.59E+05	7.97E-11	2.38	69.03
	2	3.85E-02	9.71	8.07	7.15	4.53	291.66	2.81	1.77E+05	1.37E-10	1.53	73.12
	3	3.85E-02	8.25	6.31	7.30	4.68	331.30	3.19	1.47E+05	1.26E-10	1.39	92.58
	4	4.48E-02	8.25	6.79	6.41	4.57	162.70	1.82	1.01E+05	7.48E-11	2.54	78.03
	5	4.48E-02	8.41	6.78	6.86	4.06	186.98	2.09	1.02E+05	1.11E-10	1.72	64.71
	6	4.48E-02	8.52	5.97	6.63	4.16	190.51	2.13	1.49E+05	1.01E-10	2.76	70.18
	mean	4.17E-02	8.64	6.79	6.72	4.20	225.84	2.32	1.39E+05	1.05E-10	2.05	74.61
	SD	3.45E-03	0.55	0.71	0.49	0.55	19.59	0.56	3.10E+04	2.48E-11	0.58	9.85
60 min.	1	3.85E-02	8.60	6.72	5.90	3.45	120.54	1.16	1.32E+05	7.32E-11	2.14	46.79
	2	3.85E-02	7.39	6.09	5.58	4.28	74.08	0.71	1.06E+05	3.96E-11	3.17	50.25
	3											42.06
	4											51.55
	5											52.81
	6											57.13
	mean											50.10
	SD											5.19
90 min.	1											46.45
	2											30.99
	3											40.90
	4											36.36
	5											66.19
	6	4.48E-02	9.70	7.80	7.40	4.81	163.94	1.84	1.23E+05	1.50E-10	1.53	45.19
	mean	4.17E-02	9.02	6.75	6.74	4.15	122.46	1.53	1.24E+05	1.16E-10	1.69	44.35
	SD	3.45E-03	0.90	0.57	0.58	0.51	64.27	0.65	5.25E+04	3.87E-11	0.79	12.13

Too much raw data in table

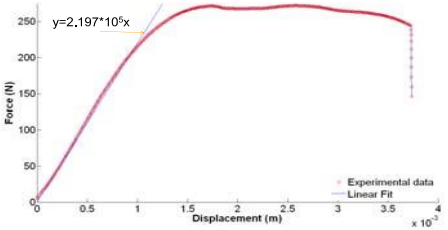


Figure 3: Representative Force-displacement plot with linear fitting of a sample control bone. The slope of the linear fit is used as the (P/V) value in calculating the E (Eqn. 1).

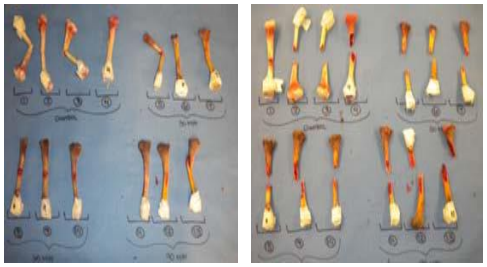
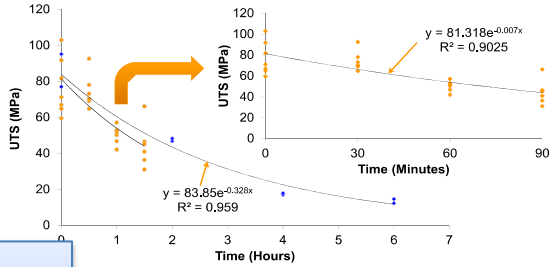


Figure 4: Sample bones after being subjected to a compressive force on the 3-point bending apparatus. The bones failed transversely.

Nice pictures – but not every sample needed



UTS-time plots with exponential fitted curves used to determine the time ones in 0.6M HCl to create an osteoporotic bone model. The first graph all of the data points for each treatment (0, 30min.-6hrs.). The second contains the data points for the treatments of (0, 30min.90min).

Control and osteoporotic UTS values as found from literature, the initial the final testing. The times calculated from the exponential fitted curves in Fig. 5 to make the bone osteoporotic are included.

	Control UTS (MPa)	Osteoporotic UTS (MPa)	Time (min.)
Literature	96.00 [7]	78.05	
Initial	86.05	69.92	33.24
Final	76.98	62.58	37.41

– this similarity in treatment time supports the reproducibility of this model.

- Limitations:
  - The E values were not analyzed in the making of this model – the values did not show to be consistent with the treatment times.
  - The chicken femoral bone is smaller than the human bones that would need the fracture fixation plating systems – may be difficult to compare.
- A greater sample number should be tested and measured with more accurate tools.
- Work should be done to create a model that can have both osteoporotic UTS and E.

Acknowledgements

Thank you to: Dr. Kristen Billiar, Mathilda Rudnicki, & Lisa Wall

References

1. Riggs, B., & Melton, L. (1995, November). The worldwide problem of osteoporosis: insights afforded by epidemiology. *Bone*, 505-511.
2. Sommers, M. B., Fitzpatrick, D. C., Madey, et al.(2007). A surrogate long-bone model. *Journal of Biomechanics, 40*(15), 3297-3304.
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REU Site: Integrated Bioengineering Research, Education, and Outreach
Females and Underrepresented Minorities at WPI (EEC0754

[1]Amanda Zoë Reidinger, [2]Jeanne Hubelbank, [3]Terri A. Camesano, [1]Marsha W. Rolle, [1]Kristen L. Bi
[1]Department of Biomedical Engineering, WPI; [2]EvalConsult, Sudbury, MA; [3]Department of Chemical Engine

Use bullets instead of paragraphs

Background color makes poster stand out – but minimal actual area covered

Abstract

in bioengineering
2. to facilitate personal and professional development of the students in areas important for careers in engineering
3. to provide middle school students with one-on-one mentored laboratory experiences with positive engineering role models that they can identify with

REU Activities and Examples

Activities	Examples
Independent bioengineering research projects	Tissue engineering, biomaterials, microbial infections, and nanotechnology
Faculty mentors from multiple departments	Biomedical Engineering and Chemical Engineering
Weekly seminars and workshops	Mentoring skills, ethics in science, professional presentations skills, how to choose a graduate school, professional writing, etc.
REU students act as mentors to middle-school students	One-week full time Bio-Discovery Program
Professional presentations	Program sympos... presentations at ... (BMES) including ... presentation

Color helps table

Outcom

Research activities: REU ... assessed, with many incre... hypothesis and research p... experiments; Create a data analysis plan; Use laboratory equipment; Interpret data to make decisions. Also, most mentors indicated that their REU mentee had become an independent researcher over the summer.

Professional proficiency: REU students reported gains in all areas with many increases being statistically significant: Research presentations, Professional writing, Professionalism and ethics, Preparation for applying to graduate school, and Mentoring. Also, 6 of 10 students attended the Biomedical Engineering Society national annual conference, with 5 posters and one platform presentation.

Outcomes for Middle-School Students

	...tcomes
Group projects (examples): •Pig heart dissection •Structure building contests •Edible "blood" and liquid N_2 ice cream!	•78% report more interested and 22% slightly more interested in science than they were before •78% "strongly agreed" and 22% "agreed" that they "could be an engineer if I wanted to."
Independent projects: •1-on-1 mentoring by REU student •Posters based on individual projects, e.g., "Building Prosthetics", "Heart rate and Exercise", "Bone Strength", "Diffusion," etc.	•Student quotes: "I loved every part," "the pig heart was amazing." •REU student comment: "[we loved] seeing the changes in the girls from skeptical/don't want to be there to enthusiastic"

REU Student Profile (2010)

163 Applicants: 133 (82%) female, 37% were non-white, of which 7% were black and 9% were Hispanic

10 Participants: 80% female, 50% minority (20% Black, 10% Hispanic, 10% Asian, 10% White/Native American)
60% from schools that do not offer a Ph.D. in BME (including 3 from community college)
2 participated as supplement to RET

Fun rotated photos… for lay audience

Me...

Coho...		
REU S...		
Faculty	Post-program survey	100%
Middle School Students	Post-program survey	100%
Middle School Parents	Post-program survey	100%

Bio-Discovery Student Profile (2010)

9 students; 100% female
7th-8th graders
77% of whom were minorities (33% Asian, 22% Black, 11% Asian/Hispanic, 11% White/Asian)
Focus on Worcester public schools

Broader Impacts (2004-2010)

- Training provided to 45 female undergraduates in bio-engineering research (>30% underrepresented minorities)
- Positive career impact encouraging graduate study
- High percentage present at national meeting (e.g., BMES) (6 of 9 in 2009, and 6 of 10 in 2010)
- Positive mentoring experience
- Mentoring provided for 41 female middle-school students
- Improved interest in STEM for middle school girls

Acknowledgements

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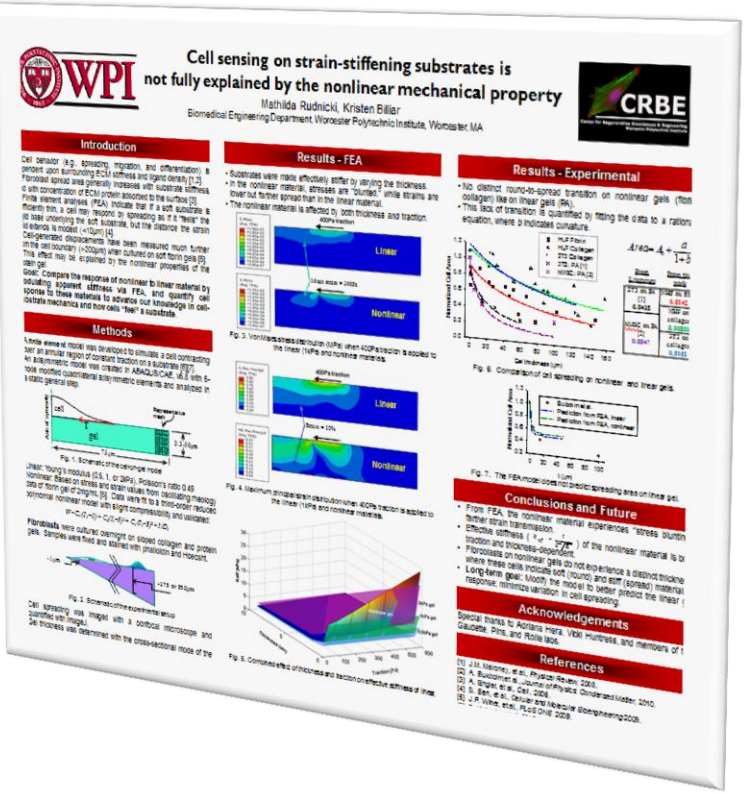
Checklist

- Effective Title
- Clear objective and main conclusion
- Logical flow
- Legible text and graphics
- Multiple types of visual aides
- White space
- Proper acknowledgement and citations



Acknowledgements and resources

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- Zoe Reidinger (Ph.D. candidate, WPI)
- The University of Texas at Austin – images and content
  - Office of Undergrad Research & Center for the Core Curriculum - School of Undergraduate Studies

Resources

- Worcester Polytechnic Institute, Academic Technology
  - http://www.wpi.edu/Academics/ATC/Media/poster-tips.pdf
- The University of Texas at Austin
  - http://www.utexas.edu/ugs/our/poster
- Stanford
  - http://ppop.stanford.edu/posters.html

Poster Presentations

More than just the poster…

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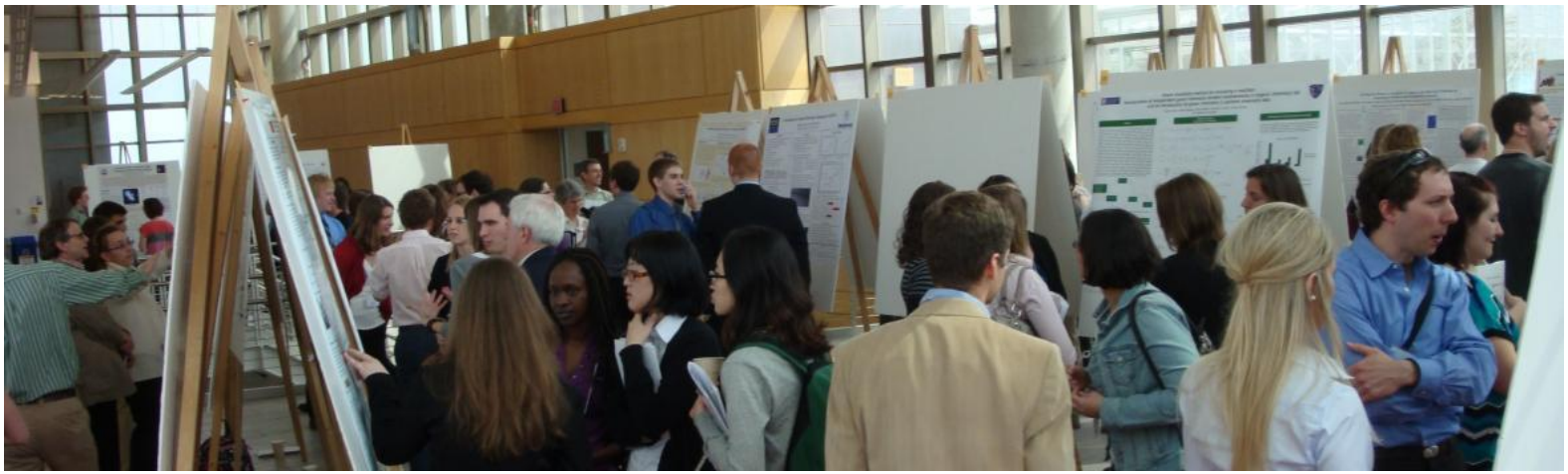
Outline

1. Audience identification
2. Engage presentation
3. Networking
4. Other resources
5. Take-home messages

BMES

Know Your Audience

- Who will you be speaking with?
- What way will you peak their interest?
- How can you adjust your presentation?



http://www.mnmas.org/

Know Your Audience

- Example: BMES Annual Meeting
  - Biomedical engineers
  - Broad backgrounds and interests
  - Hoping to view many posters

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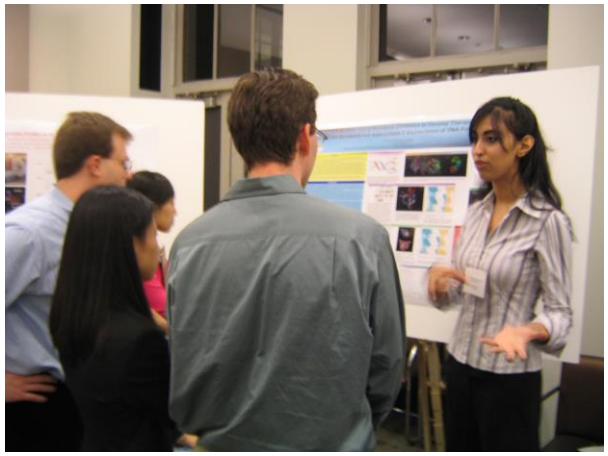
Engaging Presentation

- Prepare a 2-4 minute talk
  - Provide a clear background
  - Focus on highlights and figures
  - Summarize major points
    - Put work in larger context
- Practice talk beforehand
  - Scientific colleagues and others
  - Incorporate feedback



http://web.mit.edu/bmes/www/PosterSession.html

Questions to Ask

- Ask to take others through your work
  - "Would you like an overview of my poster?"
- Find out their background
  - "Do you have any particular interests?"
- Make it a conversation
  - "Does that make sense?"

Polling Question

When presenting a poster, should you look at:

1) The poster?
   - That is the most important aspect

2) The viewer?
   - They should be your primary focus

3) Both the poster and the viewer?
   - Directing attention

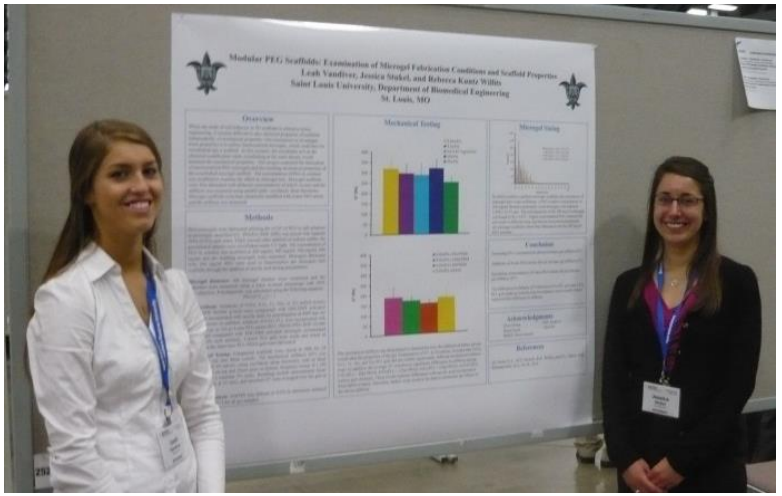
Human Interactions

- One engaged viewer attracts others
- Firm handshake
- Make eye contact
- Be confident
  - But don't be afraid to say you don't know

http://clearedjobs.net/blog/9-interviewing-mistakes-security-cleared-job-seekers-should-avoid/handshake/

Communicating Effectively

- Speak clearly and slowly
- Ask if anyone has questions
- Smile and have fun ☺

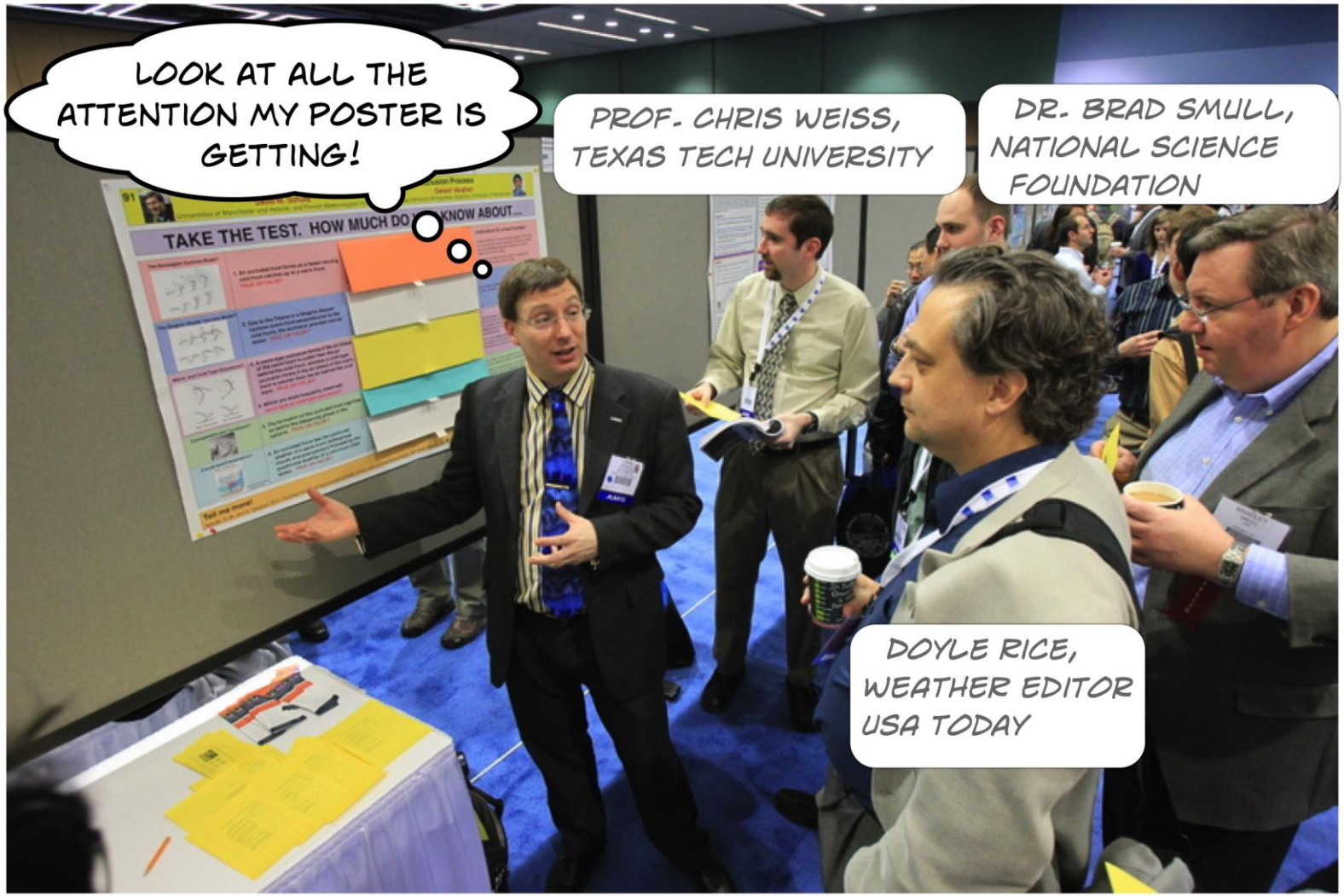


http://parks.slu.edu/news-events/news/2010/10/26/bmes-2010-conference-/

Interactive Posters?

- Animations
  - Laptop, phone, tablet
- Physical objects
  - Show-and-tell
- Demonstrations

http://www.engadget.com/2006/06/07/pepsi-posters-let-you-plug-in-your-headphones/



http://eloquentscience.com/wp-content/uploads/2011/02/Poster.jpg

Polling Question

Do you bring business cards to conferences?

1) Yes
   - Carry them with me at all times!
2) Sometimes
   - When I don't forget.
3) No
   - Why would I need those?
4) What is a business card?

Handouts

- Contact information exchange
  - Business cards
  - Phone bump
    - http://www.youtube.com/watch?v=4kCXKrAbdiQ
  - *Ask for their information*
- Legible paper printout of poster
  - Also available online
- Pamphlets, publications, etc.

http://www.zazzle.com/businescards

After the Conference

- Learn about those who stopped by
- Follow up with emails and phone calls
  - Thank them for their interest
  - Send supporting publications
- Connections can last

Other Resources

- Preparing and presenting effective research posters
  - http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1955747/
- Ten simple rules for a good poster presentation
  - http://www.ploscompbiol.org/article/info:doi/10.1371/journal.pcbi.0030102
- Mortal sins in poster presentations (how to give a poster no one remembers)
  - http://www.sicb.org/newsletters/fa97nl/sicb/poster.html

Other Resources

- Practicing your poster presentation
  - http://www.tc.umn.edu/~schne006/tutorials/poster_design/practice_01.htm

- Do's and don'ts of poster presentations
  - http://www.stanford.edu/group/blocklab/dos%20and%20donts%20of%20poster%20presentation.pdf

Take-Home Messages

1. Know your audience
2. Develop engaging presentation
3. Be confident
4. Network before, during, and after
5. Have fun!

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Polling Question

Do you know feel more confident about how to prepare an effective poster presentation?

1) Yes
   - This was helpful

2) Somewhat
   - Still confused about some aspects

3) Not really
   - I was an expert already

Acknowledgements

- Amy Bogucki, Purdue University

Thank you for your attention!

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QUESTIONS?

2013 BMES Events

- BMES Annual Meeting (Seattle, WA): Sept 25-28
  - **Call for Abstracts Submission Deadline**: *April 2*
- Professional Development Webinars
  - **Grant Writing**: *March 27*
  - **Industry Career Development**: *April 17*
  - **Best Practices for Teaching**: *May 16*
  - **Leadership Development & Networking**: *Aug 27*
  - **Best Practices for Running & Managing a Lab**: *Nov 7*
- Career Events
  - **Bay Area Mixer** (San Jose, CA): *Mar 26*
  - **Midwest BME Career Conference** (Chicago, IL): *April 19*
  - **Southeast & Mid-Atlantic BME Career Conference** (Washington, DC): *Oct 25*