Designing and Presenting a Scientific Poster

Jonathan Carter
Associate Laboratory Director
Computing Sciences

Poster Sessions at Major Conferences

- Sessions for attendees to mingle in an around posters and presenters
- Posters usually viewable any time the conference is in session
- Often there is a poster session or reception
- Often 100s of posters are presented

Presentations vs. Papers

Papers

- Single preplanned narrative
- Write/Read
- Remote audience
- Reader can take their time
- Multiple pages
- Arms-length interaction

Presentations

- Preplanned narrative
- Speak/Listen
- Captive audience
- Time-slot of 15-60 minutes
- Multiple slides
- Increased chance of interaction

Presentations vs. Papers vs. Posters

Papers

- Single preplanned narrative
- Write/Read
- Remote audience
- Reader can take their time
- Multiple pages
- Limited interaction

Presentations

- Preplanned narrative
- Speak/Listen
- Captive audience
- 15-60 minutes
- Multiple slides
- Increased chance of interaction

Posters

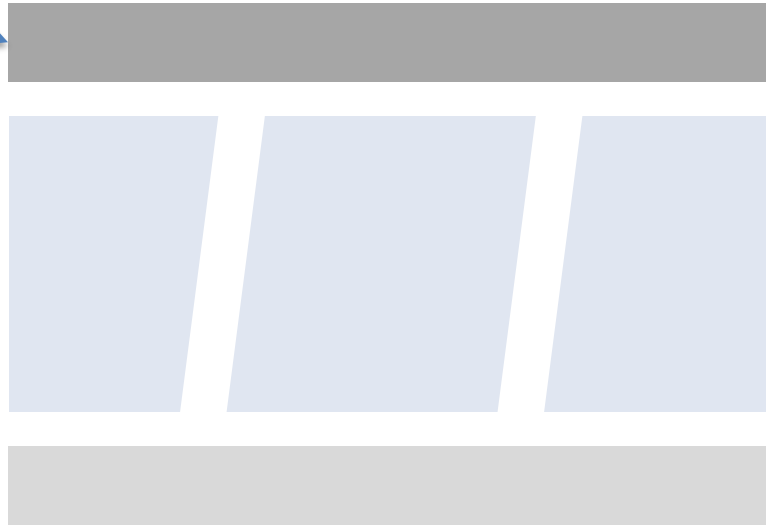
- Multiple narratives
- Discussion
- Browsing audience
- ~5 minutes per discussion
- Single page/slide
- Interactive
- *Often posters can be viewed outside of session*

Understanding Your Your Audience

- **People in your field of specialization**
  - Can get to specifics
- **People in closely-related field of specialization**
  - Need context, may be unfamiliar with your jargon
- **People in unrelated fields**
  - Need to explain the problem and the solution. Will not understand your jargon

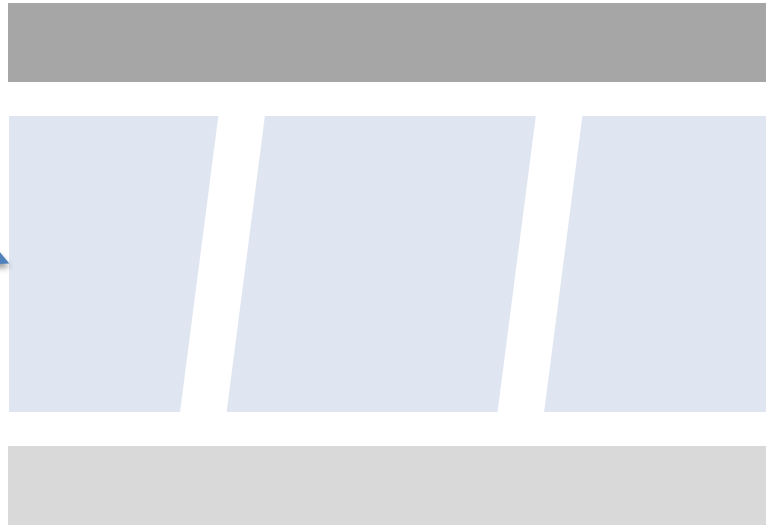
Basic Poster Content – Header

- **Title**
  - Briefly convey the subject matter, orient the viewer
  - Attract interest without gimmicks
- **Author(s)**
  - Contact Information



Basic Poster Content – Main Section Alternate #1

- **Introduction**
  - Problem Statement (why it matters), avoiding as much jargon as possible
- **Methodology**
  - Not too much detail, graphics work well in many cases
- **Results**
  - What worked, what didn't
  - Brief data analysis
- **Conclusions**
  - Your interpretations (Don't repeat results)
  - Further work
- **Extras**
  - QR Code: Pointer to online resources
  - Flip or slide panels
  - Video



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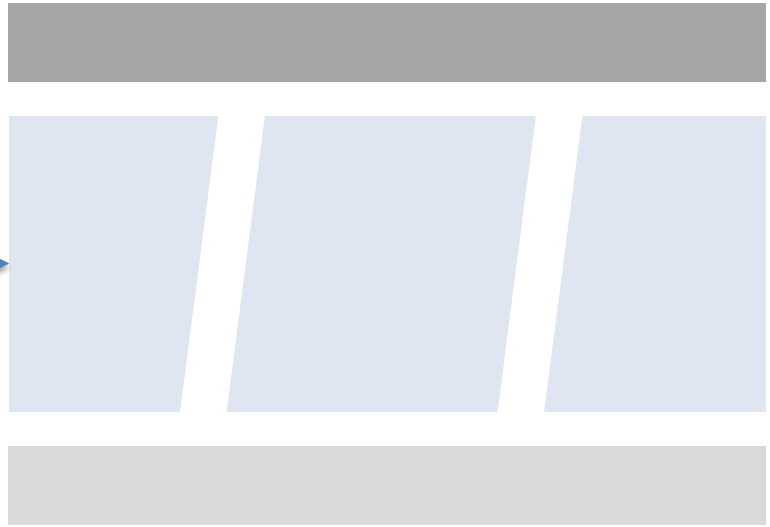
Basic Poster Content – Main Section Alternate #2

- **Introduction**
  - Problem Statement (why it matters), avoiding as much jargon as possible
- **System Design & Features**
  - Not too much detail, graphics work well in many cases
- **Future Enhancements**
  - Further work
- **Extras**
  - QR Code: Pointer to online resources
  - Flip or slide panels
  - Video



Basic Poster Content – Footer

- **Citations**
- **Acknowledgements/ Logos / Institutional Verbiage**
- **Further Information**

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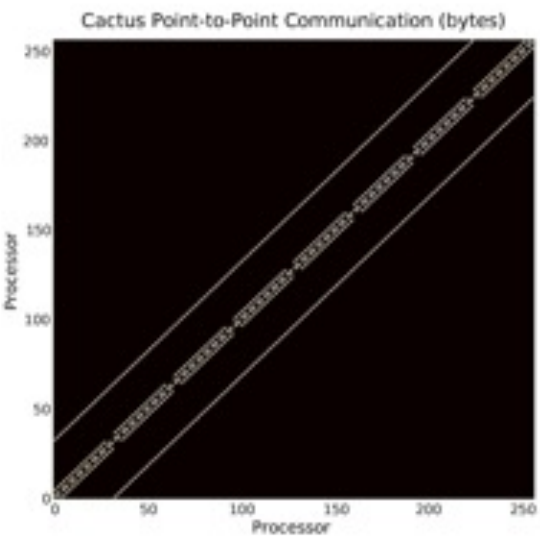
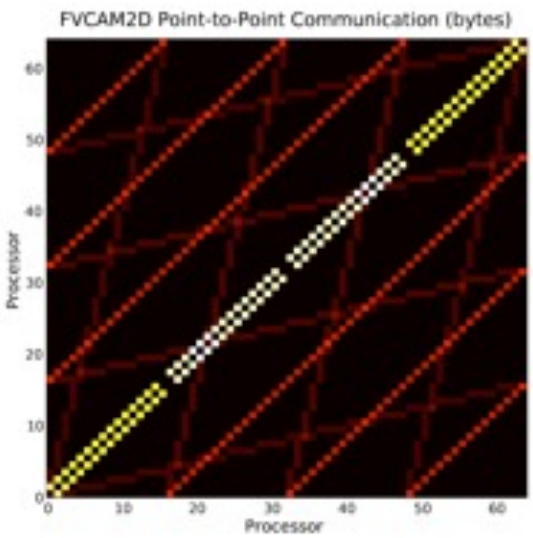
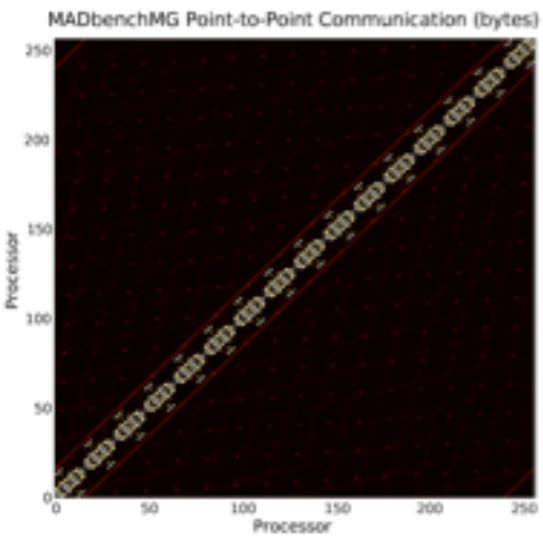
Use Visual Communication

- Graphics to help you talk to your work
- Label graphs and charts legibly, and clearly enough that the label stands on its own
- Use different portions of poster to engage at different level of abstraction and separate logical concepts







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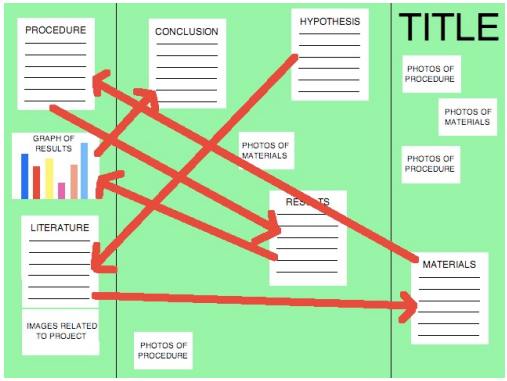
Things to Avoid (1)

- **Avoid over-crowded or busy layouts**
  - Flow is often confusing, or the eye doesn't know where to look

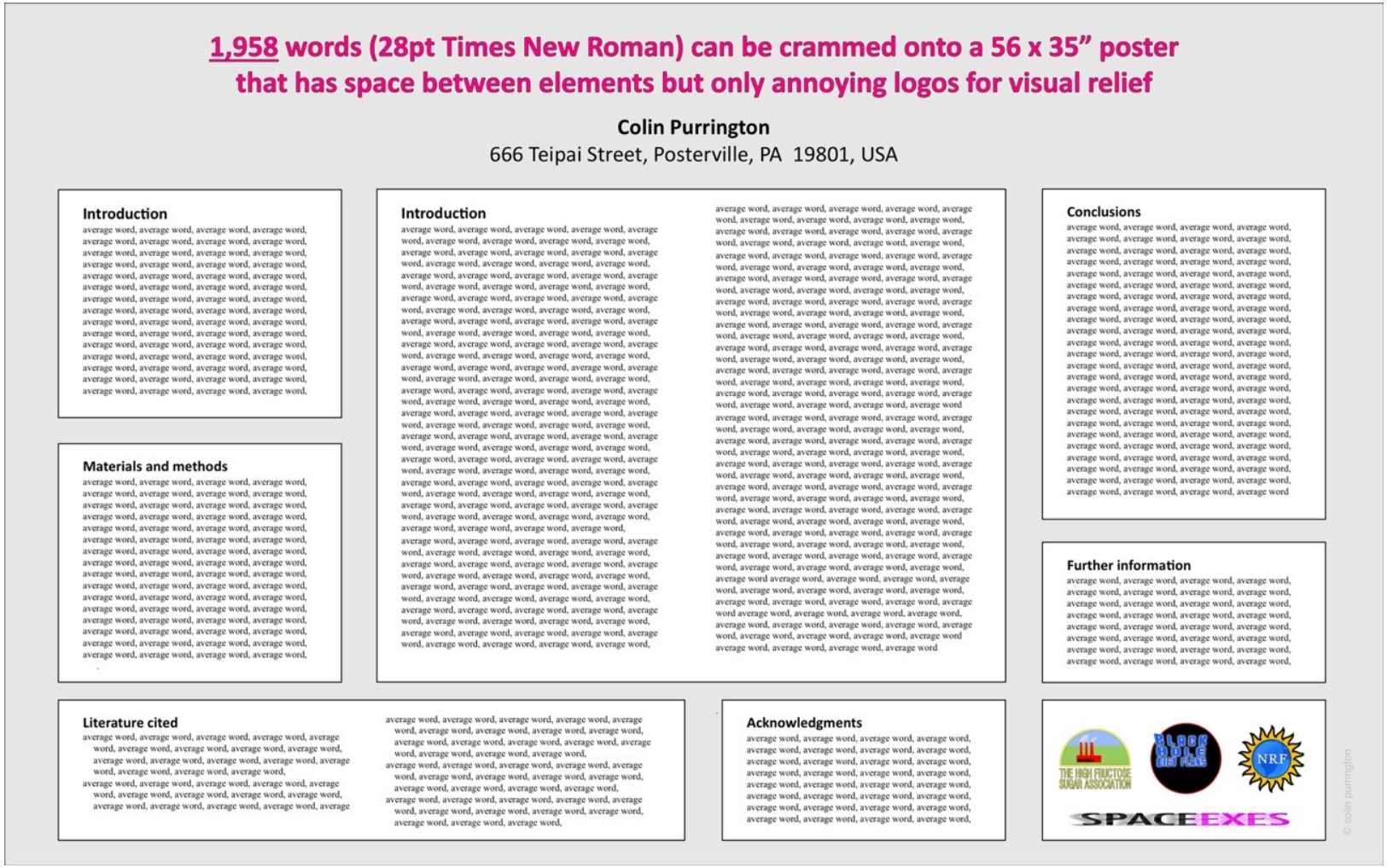


http://sciencefair.math.iit.edu/display/layoutflow/

- **Avoid garish color schemes or awkward font choices**
  - Dark backgrounds can print poorly

http://bonfx.com/bad-typography/

Things to Avoid (2)



1,958 words (28pt Times New Roman) can be crammed onto a 56 x 35" poster that has space between elements but only annoying logos for visual relief

Colin Purrington

666 Teipai Street, Posterville, PA 19801, USA

Introduction

Introduction

Conclusions

Materials and methods

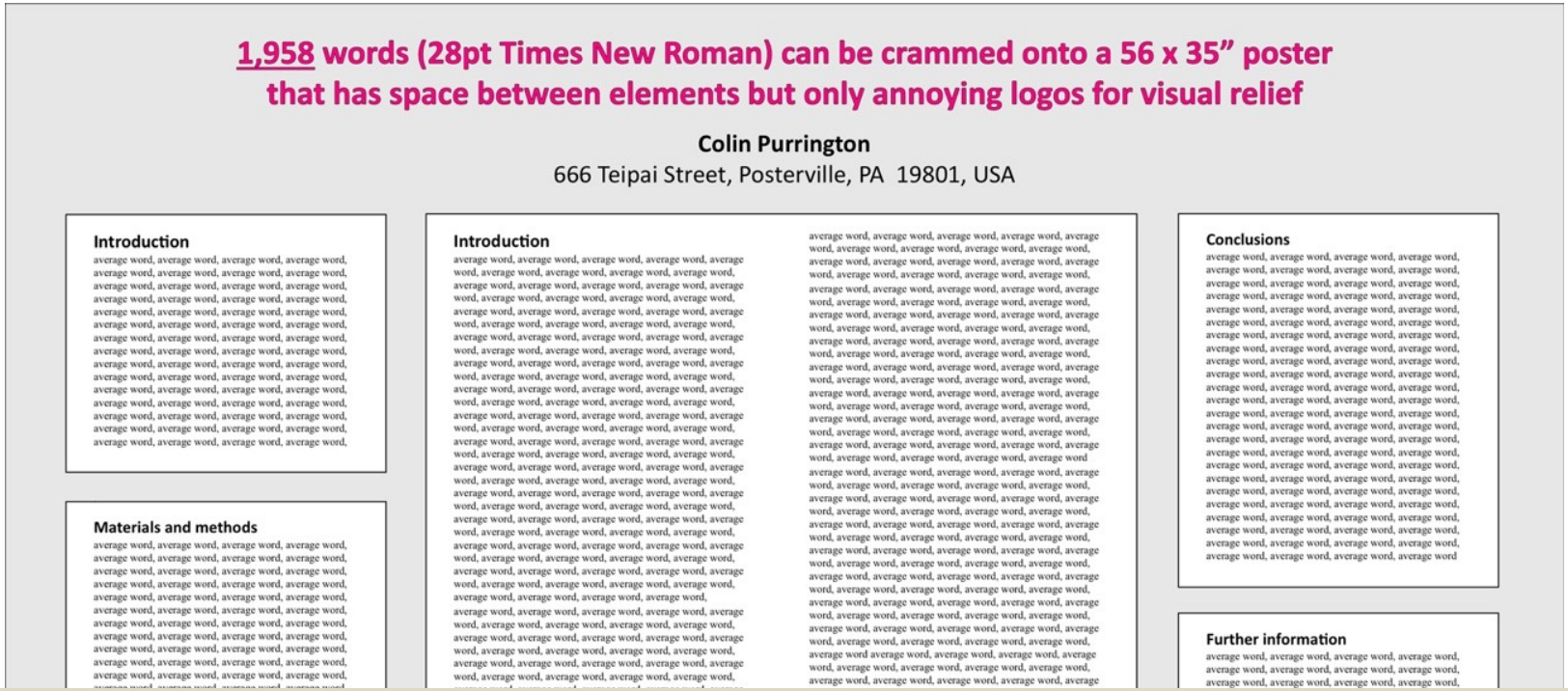
Further information

Literature cited

Acknowledgments

http://colinpurrington.com/tips/poster-design

Things to Avoid (2)



- **Avoid writing an article pretending to be a poster**
  - Aim for 500-700 words
- **Avoid large blocks of condensed text**
  - Use appropriate white space
  - Consider using lists

Things to Avoid (3)

Different parts of poster don't line up	Boxes within boxes	Zigzag reading order	More than three **typefaces**	Long-winded title
Gradient fills in coloured boxes	Big blocks of text	Photographic background	Unlabelled error bars on graphs	Pixelated pictures
More than five colours	Institutional logos bookending title	Free space	ALL CAPITALS	Text with shadows, outlines, or bevels
Abstract	Underlined text	Comic Sans	3-D graphs	Checking tablet or phone during presentation
Tables showing data that could be in a graph	Poster does not fit on poster board	Comic Sans (it's that annoying)	Objects almost touching or overlapping	Tiny, unreadable type

Don't Be a Winner at Bad Poster Bingo by Zen Faulkes
http://betterposters.blogspot.com/2013/10/bad-poster-bingo.html

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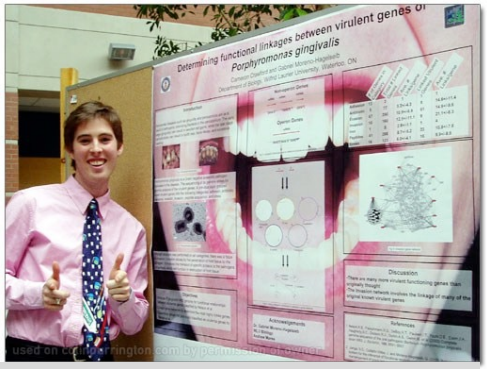
Marketing Your Poster

- Make your poster compelling so it will stand out
- Look like you want people to stop and talk
- Don’t stand in front of your poster
- Make room for multiple visitors
- Talk to your visitors as opposed to your poster
- Think of various short pitches that you could employ
- Handouts, business cards

Can be taken to excess:
Keegan, D.A., and S.L. Bannister. Effect of color coordination of attire with poster presentation on poster popularity. *Canadian Medical Association Journal* 169:1291-1292 (2003)

http://betterposters.blogspot.com/2012/03/colour-clash.html



Pink Guy with Pink Poster. Nicole Barker.

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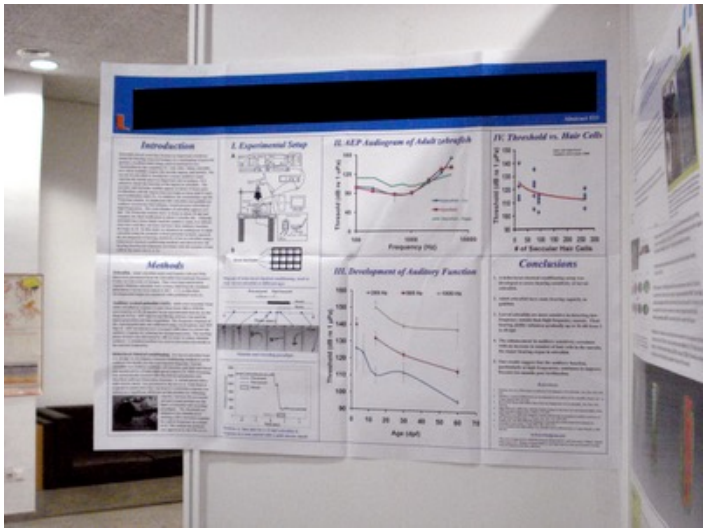
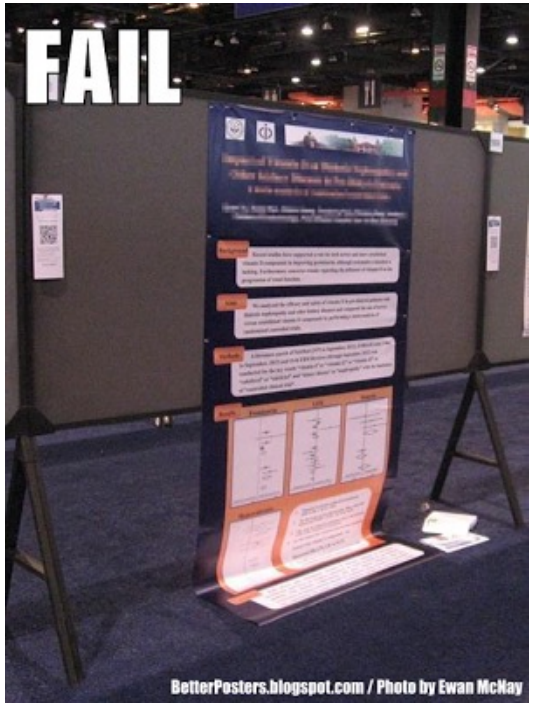
1-Minute Pitch and/or Video Introduction

- **Many poster programs feature a set of 1-minute pitches where all poster authors can explain why someone should visit their poster**
  - You need a hook to stand out
  - Pose a puzzle
- **Recent virtual poster sessions often have online posters accompanied with short introduction videos by authors**
  - Record one of your pitches and use a visual on the poster

Follow Poster Session Instructions

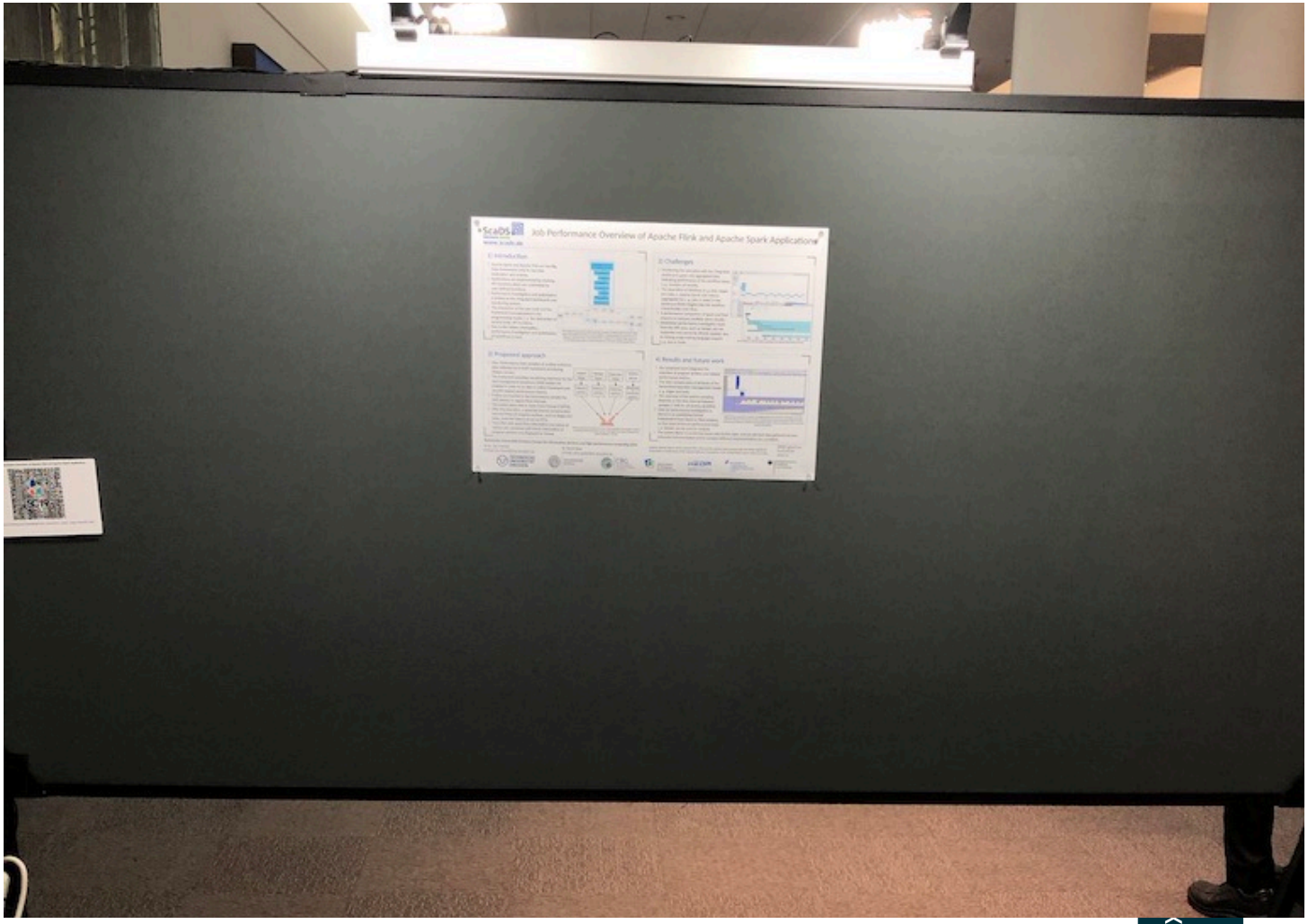
- Note format and size requirements





- Put up and take down your poster in a timely manner

Standing Out - Posters from SC19



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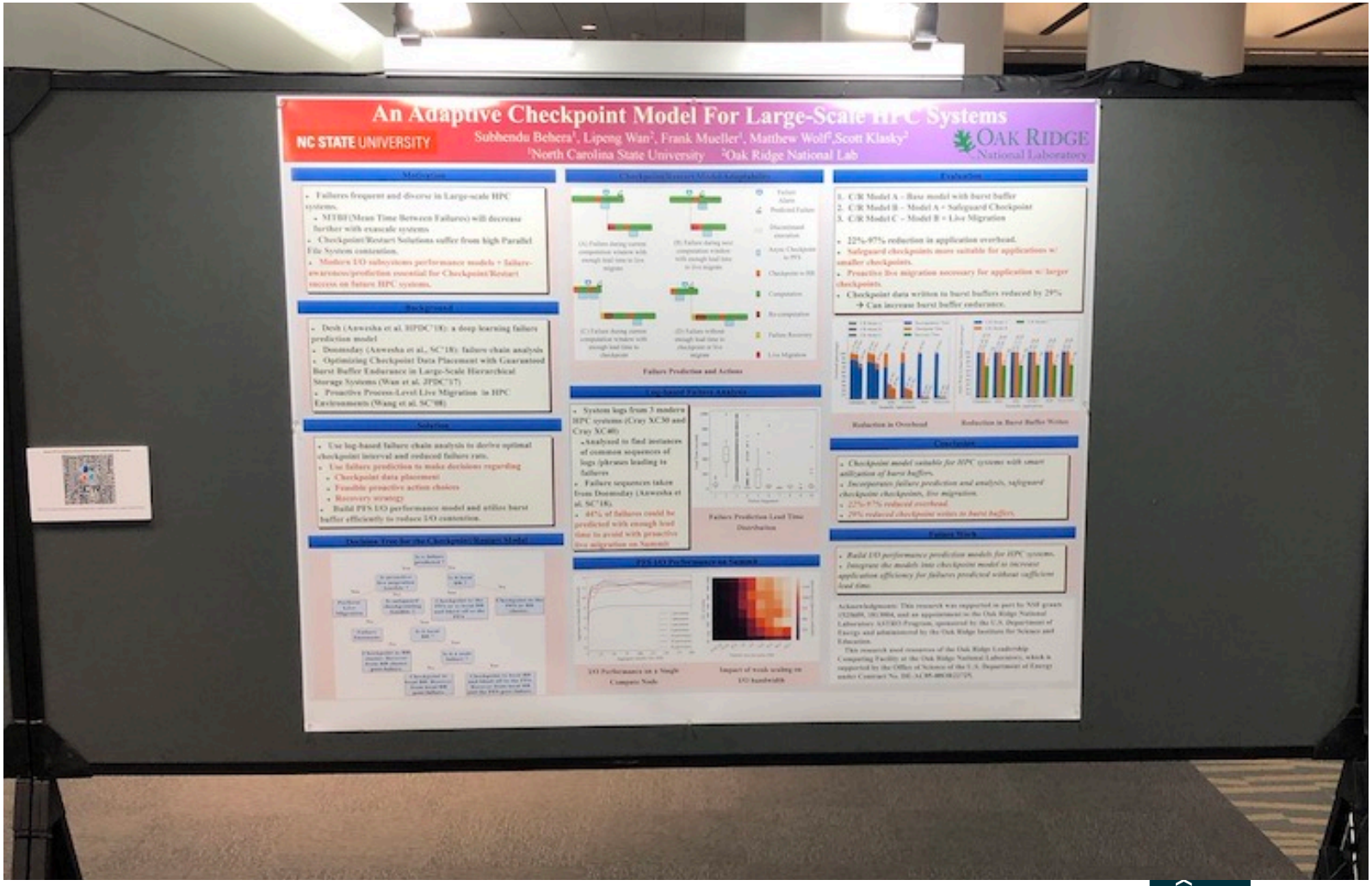

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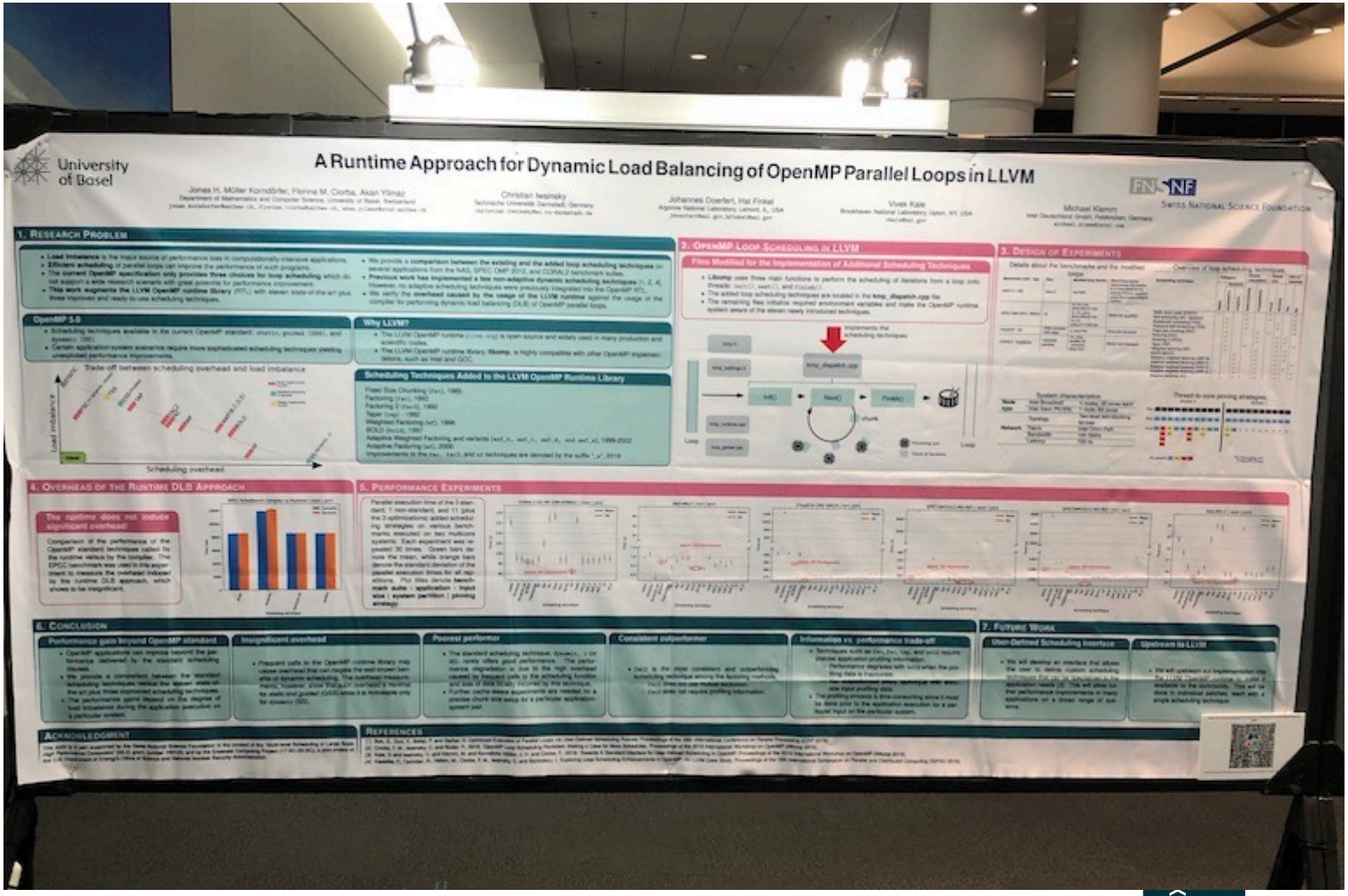

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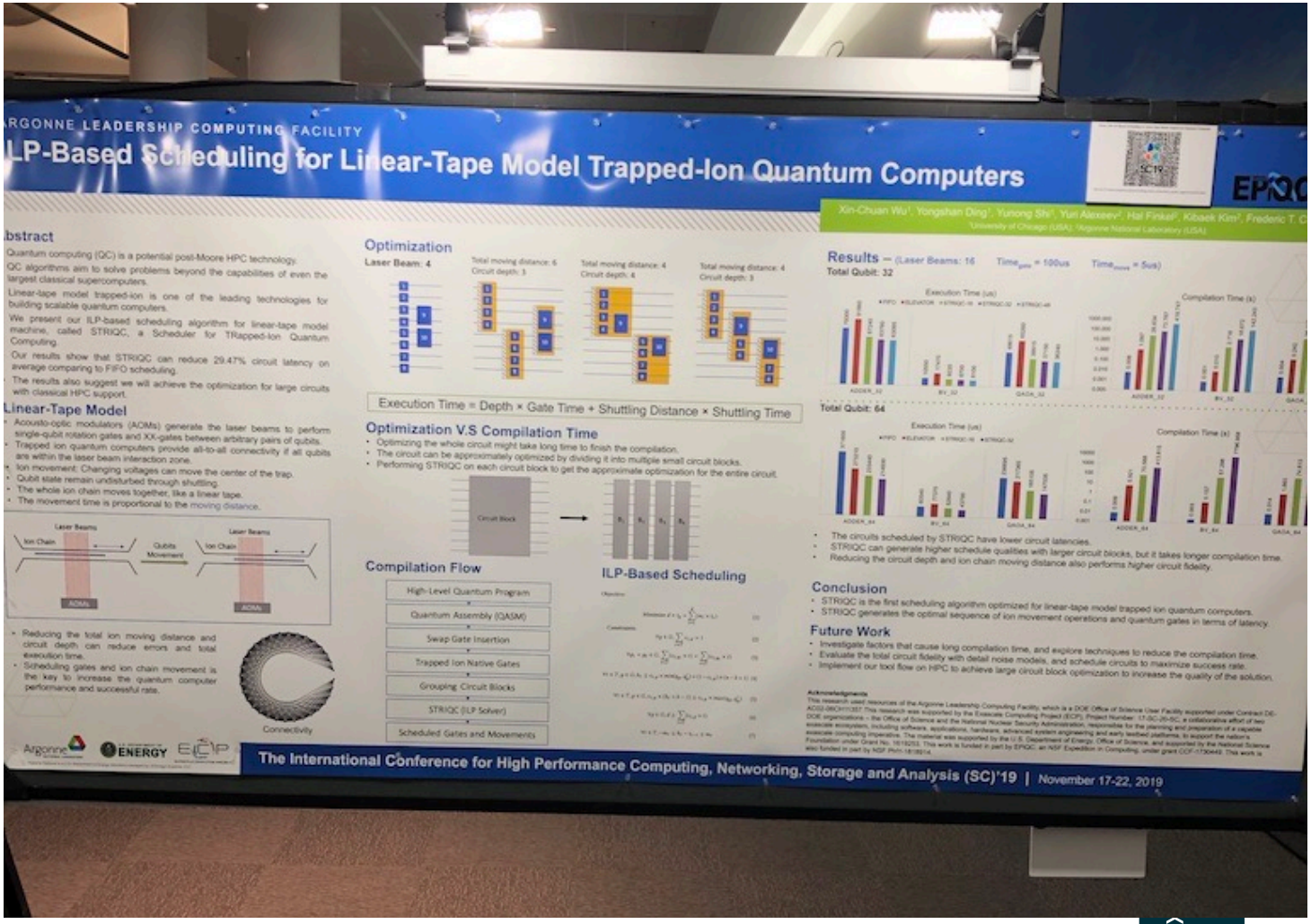

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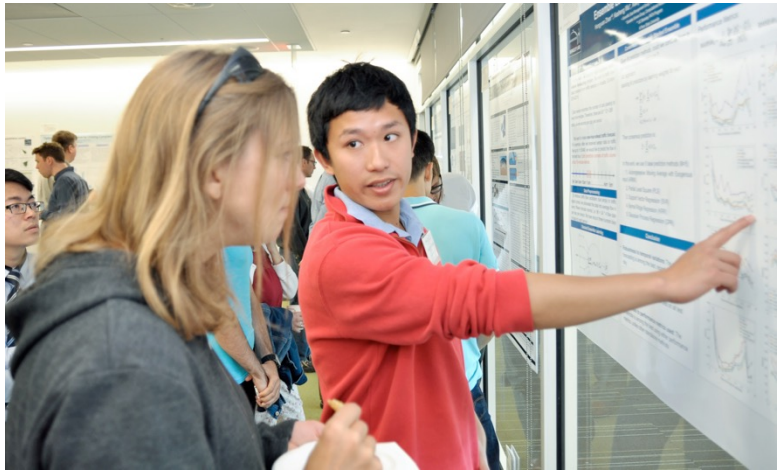
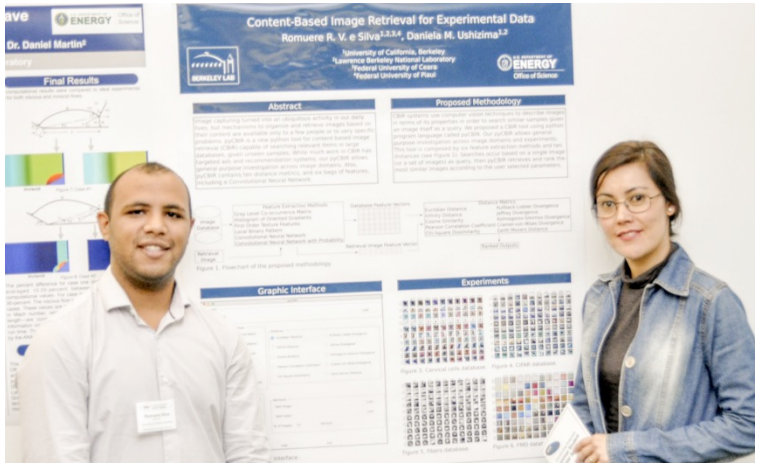
Resources

- **Colin Purrington, Swarthmore College**
  - http://colinpurrington.com/tips/poster-design
  - Suggestions for software, templates, and more…
- **Zen Faulkes, University of Texas**
  - http://betterposters.blogspot.com
  - Advice and poster critiques, up-to-date resource,…
- **George Hess, Kathryn Tosney, and Leon Liegel, North Carolina State University**
  - http://go.ncsu.edu/posters
  - More basic advice on formats, style, poster elements, etc.

CS Summer Visitor Program Virtual Poster Session

- August 3rd 10:00am PT
- Posters and walkthrough video due by July 23
- Posters and videos will be available for staff to view online on July 28
- Students will be assigned to a zoom break out room with 3-4 students per breakout room
- Attendees will be able to navigate through the breakout rooms meeting with and discussing the posters with the students





High visibility for lab scientists in CS and elsewhere in the lab

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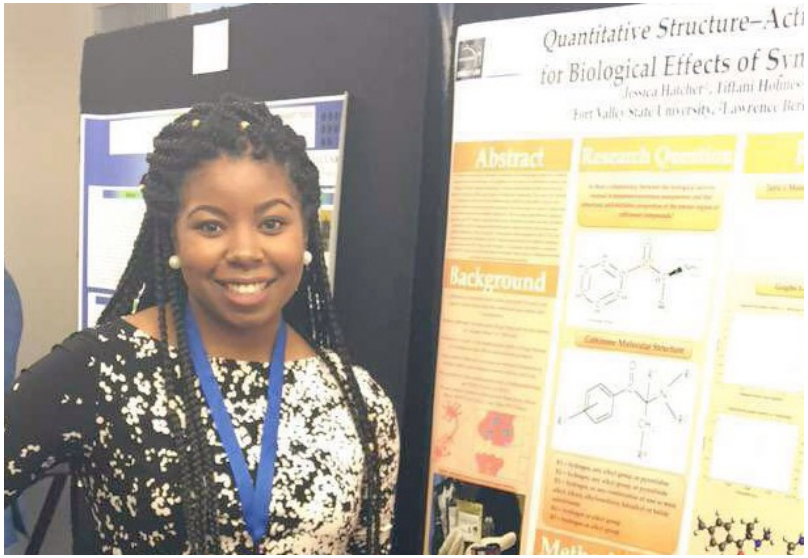
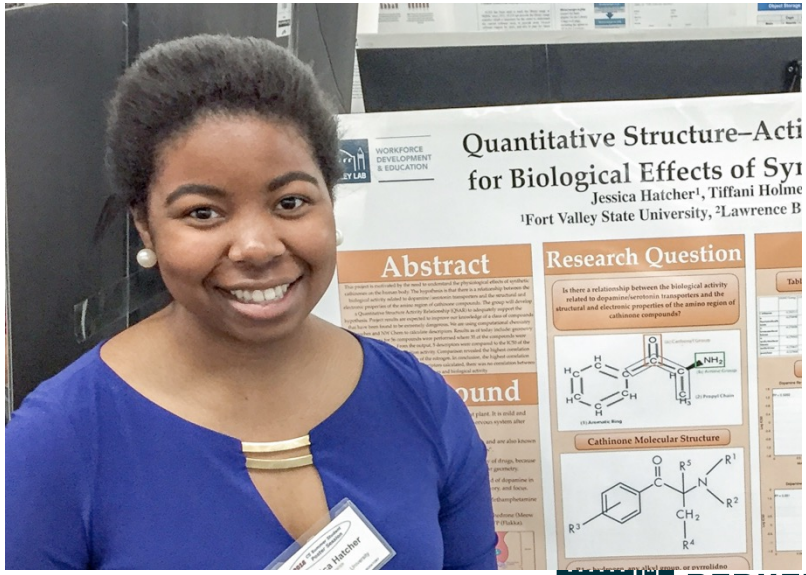
CS Summer Student Program Poster Session

- **A great way to practice poster design and presentation**

Jessica Hatcher from Fort Valley State University in Georgia won a first-place award for her research poster "Quantitative Structure Activity Relationships (QSAR) for Biological Effects of Synthetic Cathinones" at the 74th Joint Annual Meeting of The National Institute of Science / Beta Kappa Chi National Scientific Honor Society





Examples

WHICH IS MORE IMPORTANT: NUMBER OF PATCHES OR CONNECTIVITY?

Darin Kalisak, PBS Student

Contact: dlkalisa@unity.ncsu.edu

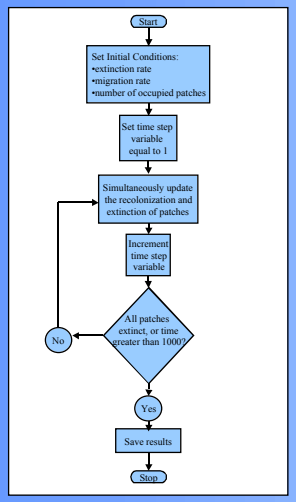
INTRODUCTION AND OBJECTIVES

Metapopulation conservation efforts with limited resources would benefit from a clear understanding of the effects of different conservation strategies, so that the conservationists can decide how to best spend their resources. In particular, in metapopulations with randomly occurring patch extinction and recolonization, it is desirable to know what conservation strategy is more effective: is it better to spend effort to add new patches to the metapopulation, or is it better to spend that effort to facilitate migration between patches?

As an aid to real-life conservation efforts, this model might be useful in weighing various strategies. For example, if the conservation choices for an endangered species are either to buy land to connect existing habitats (increasing connectivity), or to simply work to preserve multiple habitats (increasing number of patches), the model may avoid a solution which is economically preferable but ecologically ineffective.

I developed a simple metapopulation model to investigate this issue. I ran the model using varying numbers of patches, where each patch is considered to be either extinct or occupied, and where every pair of patches is either connected or disconnected for purposes of migration. The whole metapopulation is considered to be extinct if and only if all of the patches are extinct.

THE PROGRAM



ASSUMPTIONS AND LIMITATIONS

•Additional migration pathways were added in a manner which kept the number of pathways for each patch fairly constant. No effort was made to investigate the effects of less symmetric configurations.

•Starting patch habitation was randomly determined, and so the results may not correspond well to specific species metapopulations with known starting conditions.

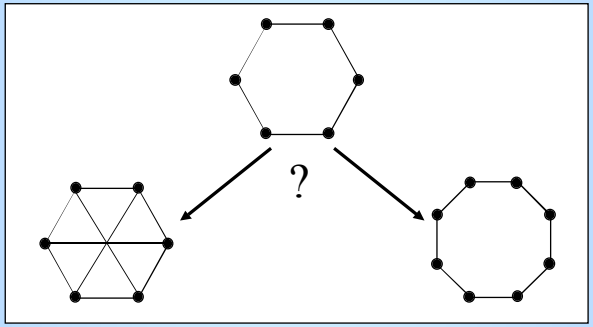
•All patches were assumed to be either fully occupied or extinct, and of equal value to the metapopulation.

•All migration pathways were equivalent, regardless of spatial distances or other factors involved.

•The model had a low resolution for differing probabilities of extinction and migration.

•The model amalgamated results from differing extinction and migration probabilities within a number of patches. It is possible that for specific parameter values, this amalgamation will hide results contrary to the overall trend reported here.

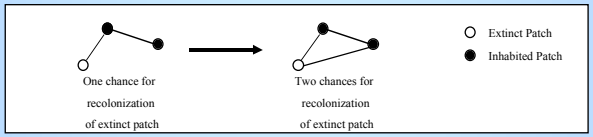
THE ISSUE



A metapopulation is a collection of discrete population patches, in which individual patches may typically go extinct and be recolonized. Is the long-term viability of the metapopulation helped more by adding new patches or by increasing the number of migration pathways between existing patches?

Adding patches increases the overall population of the organism, and makes a total extinction less likely by increasing the sheer number of patches which would have to go extinct.

Adding migration pathways increases the likelihood of recolonization of extinct pathways, by giving extinct patches more sources for immigration.

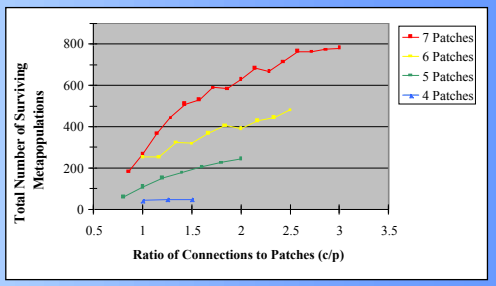


RESULTS

I tested the model by running simulations which varied over four parameters:

- number of patches (values 4, 5, 6, and 7)
- minimally connected to maximally connected (expressed as the ratio of migration pathways to number of patches, or c/p)
- time-step-extinction probabilities of .2, .4, .6, and .8
- time-step-migration probabilities of .2, .4, .6, and .8

For every combination of these parameters, I ran 100 simulations of 1000 time-steps each, and tracked the number of instances out of those 100 runs that the metapopulation did not go extinct. For each number of patches, I then summed the numbers of surviving metapopulations for each connection ratio to obtain a summary value for each patch/pathway configuration. The results are graphed below. The model showed that increasing the number of patches by only one patch had a far greater effect on metapopulation survival than did increasing the connectivity between patches. A horizontal line intersecting two result curves would, at each intersection, show the ratio of connectivity necessary to achieve the same survival rate for each of the two metapopulations. In every case, the metapopulation with the greater number of patches requires a lower connectivity ratio to maintain the desired survival level. In some cases, as with four patches, no increase in connectivity could have the same effect on metapopulation survival as a adding a single patch.



CONCLUSIONS

The results of this model indicate that, when possible, adding patches to a metapopulation is far preferable to incremental increases in numbers of migration pathways. There are some cases in which substantial gains in numbers of pathways can improve the long term viability of the metapopulation compared to addition of a patch. When the costs of these additional pathways is relatively low, this may be a good strategy, however in most cases the greatest benefit to the metapopulation will come from adding more patches.

It is worth noting that in our results, the curve for each additional patch is steeper than the last. It may be that the low numbers of patches I tested are an important limit on the effects of connectivity. Simulations using larger numbers of patches may show that increased connectivity can have a greater effect on metapopulation survival than is seen here.

WHICH IS MORE IMPORTANT: NUMBER OF PATCHES OR CONNECTIVITY?

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I developed a simple metapopulation model to investigate this issue. I ran the model using varying numbers of patches, where each patch is considered to be either extinct or occupied, and where every pair of patches is either connected or disconnected for purposes of migration. The whole metapopulation is considered to be extinct if and only if all of the patches are extinct.

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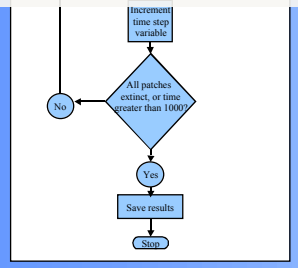

The program was made to investigate the effects of patch number and connectivity on metapopulation survival. The results may not correspond well to specific species metapopulations with known starting conditions.

•All patches were assumed to be either fully occupied or extinct, and of equal value to the metapopulation.

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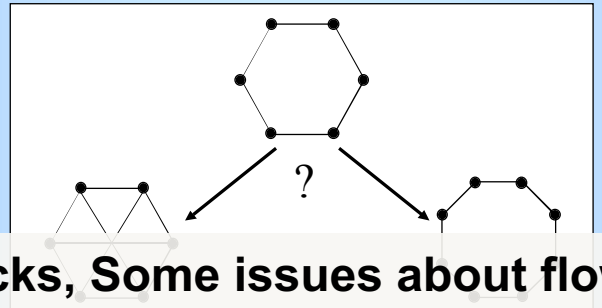

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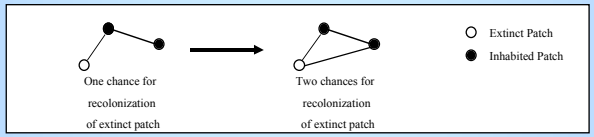

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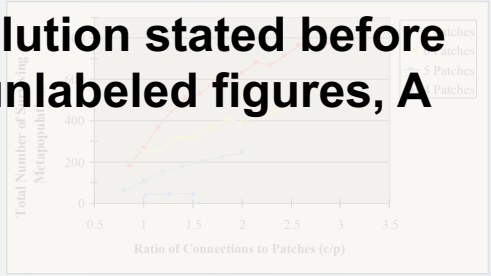

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- **Too many large text blocks, Some issues about flow (solution stated before problem), Poor color contrast in some sections, Some unlabeled figures, A cut-and-paste from Excel, but**
- **A reasonable overall balance and format, clear titles**

G.R. Hess, K. Tosney, and L. Liegel. 2010. Creating Effective Poster Presentations. http://www.ncsu.edu/project/posters

PIGS IN SPACE: EFFECT OF ZERO GRAVITY AND AD LIBITUM FEEDING ON WEIGHT GAIN IN CAVIA PORCELLUS

Colin B. Purrington
6673 College Avenue, Swarthmore, PA 19081 USA

ABSTRACT:

One ignored benefit of space travel is a potential elimination of obesity, a chronic problem for a growing majority in many parts of the world. In theory, when an individual is in a condition of zero gravity, weight is eliminated. Indeed, in space one could conceivably follow ad libitum feeding and never even gain an gram, and the only side effect would be the need to upgrade one's stretchy pants("exercise pants"). But because many diet schemes start as very good theories only to be found to be rather harmful, we tested our predictions with a long-term experiment in a colony of Guinea pigs (Cavia porcellus) maintained on the International Space Station. Individuals were housed separately and given unlimited amounts of high-calorie food pellets. Fresh fruits and vegetables were not available in space so were not offered. Every 30 days, each Guinea pig was weighed. After 5 years, we found that individuals, on average, weighed nothing. In addition to weighing nothing, no weight appeared to be gained over the duration of the protocol. If space continues to be gravity-free, and we believe that assumption is sound, we believe that sending the overweight — and those at risk for overweight — to space would be a lasting cure.

INTRODUCTION:

The current obesity epidemic started in the early 1960s with the invention and proliferation of elastane and related stretchy fibers, which released wearers from the rigid constraints of clothes and permitted monthly weight gain without the need to buy new outfits. Indeed, exercise today for hundreds of million people involve only the act of wearing stretchy pants in public, presumably because the constrictive pressure forces fat molecules to adopt a more compact tertiary structure (Xavier 1965).

Luckily, at the same time that fabrics became stretchy, the race to the moon between the United States and Russia yielded a useful fact: gravity in outer space is minimal to nonexistent. When gravity is zero, objects cease to have weight. Indeed, early astronauts and cosmonauts had to secure themselves to their ships with seat belts and sticky boots. The potential application to weight loss was noted immediately, but at the time travel to space was prohibitively expensive and thus the issue was not seriously pursued. Now, however, multiple companies are developing cheap extra-orbital travel options for normal consumers, and potential travelers are also creating news ways to pay for products and services that they cannot actually afford. Together, these factors open the possibility that moving to space could cure overweight syndrome quickly and permanently for a large number of humans.

We studied this potential by following weight gain in Guinea pigs, known on Earth as fond of ad libitum feeding. Guinea pigs were long envisioned to be the "Guinea pigs" of space research, too, so they seemed like the obvious choice. Studies on humans are of course desirable, but we feel this current study will be critical in acquiring the attention of granting agencies.

MATERIALS AND METHODS:

One hundred male and one hundred female Guinea pigs (Cavia porcellus) were transported to the International Space Laboratory in 2010. Each pig was housed separately and deprived of exercise wheels and fresh fruits and vegetables for 48 months. Each month, pigs were individually weighed by duct-taping them to an electronic balance sensitive to 0.0001 grams. Back on Earth, an identical cohort was similarly maintained and weighed. Data was analyzed by statistics.

RESULTS:

Mean weight of pigs in space was 0.0000 +/- 0.0002 g. Some individuals weighed less than zero, some more, but these variations were due to reaction to the duct tape, we believe, which caused them to be alarmed push briefly against the force plate in the balance. Individuals on the Earth, the control cohort, gained about 240 g/month ($p = 0.0002$). Males and females gained a similar amount of weight on Earth (no main of effect of sex), and size at any point during the study was related to starting size (which was used as a covariate in the ANCOVA). Both Earth and space pigs developed substantial dewlaps (double chins) and were lethargic at the conclusion of the study.

CONCLUSIONS:

Our view that weight and weight gain would be zero in space was confirmed. Although we have not replicated this experiment on larger animals or primates, we are confident that our result would be mirrored in other model organisms. We are currently in the process of obtaining necessary human trial permissions, and should have our planned experiment initiated within 80 years, pending expedited review by local and Federal IRBs.

ACKNOWLEDGEMENTS:

I am grateful for generous support from the National Research Foundation, Black Hole Diet Plans, and the High Fructose Sugar Association. Transport flights were funded by SPACE-EXES, the consortium of wives divorced from insanely wealthy space-flight startups. I am also grateful for comments on early drafts by Mañana Athletic Club, Corpus Christi, USA. Finally, sincere thanks to the Cuy Foundation for generously donating animal care after the conclusion of the study.

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PIGS IN SPACE: EFFECT OF ZERO GRAVITY AND AD LIBITUM FEEDING ON WEIGHT GAIN IN CAVIA PORCELLUS

Colin B. Purrington
6673 College Avenue, Swarthmore, PA 19081 USA

ABSTRACT:

One ignored benefit of space travel is a potential elimination of obesity, a chronic problem for a growing majority in many parts of the world. In theory, when an individual is in a condition of zero gravity, weight is eliminated. Indeed, in space one could conceivably follow ad libitum feeding and never even gain an gram, and the only side effect would be the need to upgrade one's stretchy pants("exercise pants"). But because many diet schemes start as very good theories only to be found to be rather harmful, we tested our predictions with a long-term experiment in a colony of Guinea pigs (Cavia porcellus) maintained on the International Space Station. Individuals were housed separately and given unlimited amounts of high-calorie food pellets. Fresh fruits and vegetables were not available in space so were not offered. Every 30 days, each Guinea pig was weighed. After 5 years, we found that individuals, on average, reached [illegible] weight apparently [illegible] protocol. If space continues to be gravity-free, and we have the [illegible] overweight [illegible] space would be a lasting cure.

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Algorithmic Probes for Evaluating Computer Architectures

FUTURE TECHNOLOGIES GROUP

Behavioral Modeling Using Apex Map

Apex-Map: Memory Access Probe

Apex-Map generates memory references as stochastic variates based on sampling the following random process:

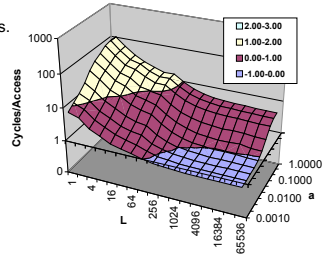
$$x_i = \frac{M}{L} r^{1/\alpha}$$

where α represents the temporal locality parameter of an application, *M* represents the memory footprint of this application, and *L* represents the spatial locality parameter of the application.

Assessing the Performance of an Architecture

Performance curve studies the system interaction with multiple locality parameters.

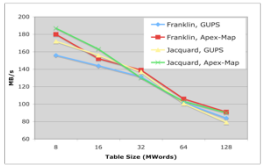
Figure shows average cycle per memory access For multiple locality Parameters. (The lower the cycles the better the performance)



Using Apex Map as an Application Proxy

Other parameters are added to the model to capture complex application, such as computational intensity, register pressure, and concurrency level.

The figures below shows the that Apex-Map can follow the behavior of CUPS application closely.

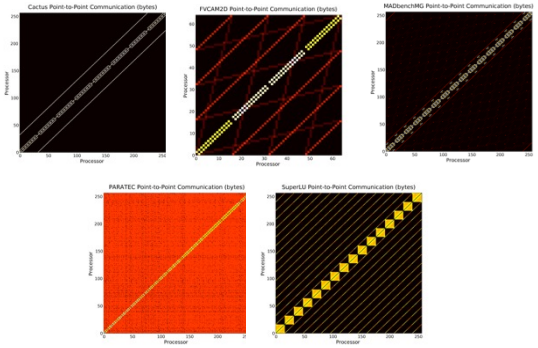


Apex-Map	Stream
Pattern	Random
Temp Locality	1
Spatial Locality	1
Reg. Pressure	1
Comp. Intensity	15
Concurrency	NUPDATE
Access Mode	NESTED

Application Characterization

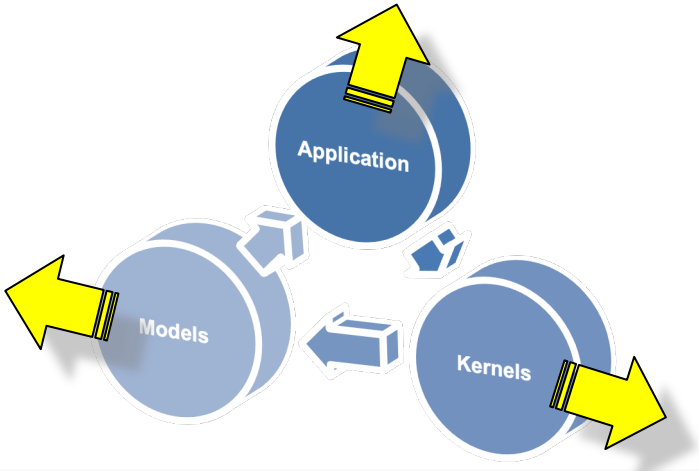
Application Communication Profiles

Characterize communication by using IPM profiling layer: run the full application unmodified and obtain the communication patterns. This shows the variety of communication signatures of DOE apps.



Extract Major Kernels

Based on communication and performance profiles, extract the major computational kernels into probes/reduced benchmarks, which can then be used for tuning and optimization.



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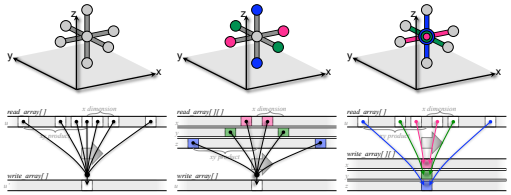
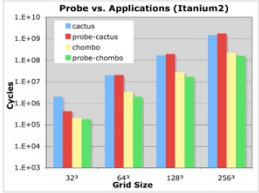
StencilProbe: Benchmark & Testbed for Stencil Optimizations

The StencilProbe enables optimization exploration of extracted stencil kernels, while avoiding the large overheads of running entire applications.



Example stencils kernels and their memory access patterns.

Using extracted kernels from Chombo and Cactus, two applications which heavily use stencils, data shows the StencilProbe accurately mimics application performance.



Discovering Prefetch Behavior using Stanza Triad

Based on the memory access pattern of cache-blocked stencils, the Stanza Triad is a simple version of the STREAM benchmark that uses *stanzas*: unit-stride triads are performed for a set number of locations before jumping in memory.

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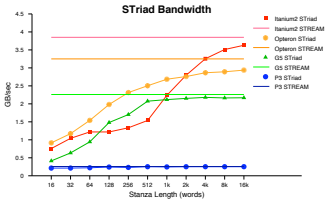

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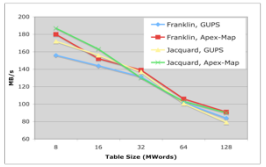

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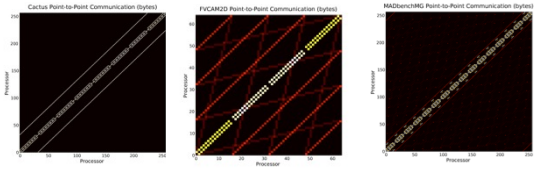

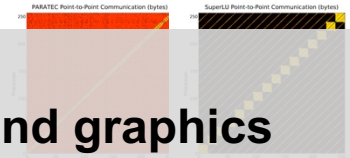

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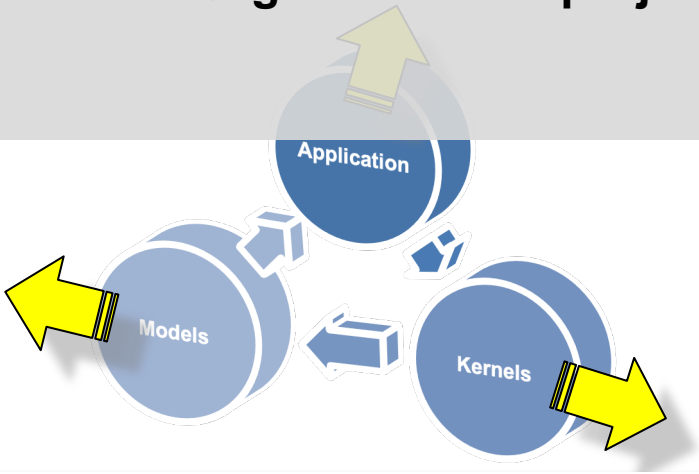

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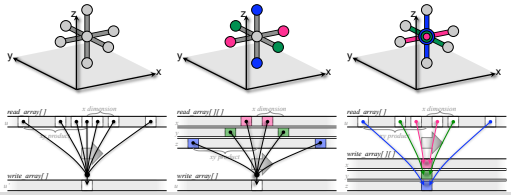

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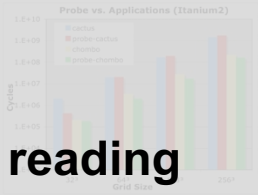

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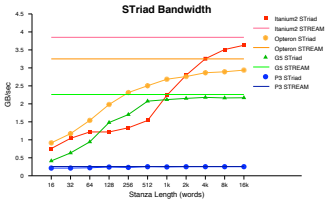


- Text font hard to read
- Good balance between text and graphics
- Good color contrast
- Organization of poster reflects organization of project, but is the reading order clear?

scaffolder

microbial genome scaffolding software

http://next.gs

michael d barton*, hazel a barton
northern kentucky university

{ NEXT GEN SEQUENCING }

millions of reads
hard to completely assemble

{ FRAGMENTED ASSEMBLIES }

repeat regions difficult to bridge
unenven read coverage

{ REQUIRE FINISHING }

join contigs together
trim nucleotide sequences
add PCR sequences

{ FINISHING ERRORS }

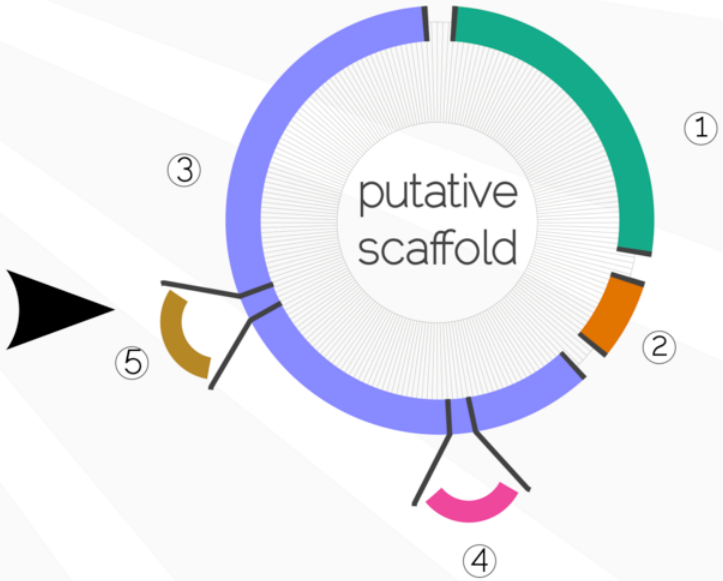
[human-error]
manually joining contigs and trimming sequences can introduce errors

[unreproducible]
manually editting a sequence can't be repeated by anyone else

[hard to change]
large blocks of nucleotide sequence are hard to update and determine the source contig

scaffold file

```
1  -
     sequence:
       source: 'sequence1'
2  -
     unresolved:
       length: 20
3  -
     sequence:
       source: 'sequence2'
       start: 30
       stop: 1000
       reverse: true
       inserts:
4      -
         source: 'insert1'
         start: 8
         stop: 160
         reverse: true
         open: 200
         close: 250
5      -
         source: 'insert2'
         open: 400
```



reproduce
remove human-error and scaffolds can be reliably reproduced from the same data

separate
separate sequence from the scaffold organisation and preserve the original assembly data

edit
easier to edit the scaffold file compared with raw nucleotide sequence

visualise
privdes an overview of the genome construction and allows easier comparions of differences in scaffolds

*mail@michaelbarton.me.uk

Michael Barton http://www.bioinformaticszen.com/post/preseting-software-on-a-poster/

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Michael Barton http://www.bioinformaticszen.com/post/preseting-software-on-a-poster/

Attributions Link Performance to Changes in Feedback: A Policy Capturing Study

Ian M. Katz, Lauren D. Murphy, Cort W. Rudolph

INTRO

- Understanding when and why individuals give certain types of constructive feedback is important in a variety of contexts (e.g., organizational, educational).
- Raters who attribute performance to ability offer more comfort-oriented feedback for poor performance and strategy-oriented feedback is associated with focusing on ratee's effort, rather than their ability (Rutten, Groot, & Dwerck, 2012)
- ***Comfort-oriented feedback*** can be considered encouragement to adopt maladaptive coping response after performance
- ***Strategy-oriented feedback*** encourages feedback receivers to change performance in the future (i.e., adaptive response to performance) while communicating guidelines and expectations
- Both ability and effort attributions mediate the relationship between observing a performance trend and subsequent ratings of the dynamic performance (Rudolph, Henri, & Nimmons, 2015)
- If there is relatively less room for improvement (e.g., a student who receives a 90% has less room to improve than a student who receives a 65%), it can be expected that teachers will attribute the performance to high ability and effort, and subsequently to offer less strategy-oriented feedback
- When performance is high, it is unlikely that teachers would comfort students for their performance because they attribute the positive performance to high effort and high ability

METHODS

- N = 548 Teachers (64.2% Female), variety of subjects taught (e.g., math, psychical science, social science, history, & English
- After reading a prompt, participants were presented with vignettes representing different performance conditions (i.e., repeated 5 times, presented at random):
  - Well-below average performance (54.0%)
  - Below average performance (63.4%)
  - Average performance (72.3%)
  - Above average performance (80.2%)
  - Well-above average performance (90.6%)
- For each vignette, participants completed an attribution measure (Rutherford et al., 2015), and a measure of strategy- and comfort-oriented feedback measure (Nelson et al., 2012)

Hypothesis 1: There will be a negative indirect effect of observed performance on strategy-oriented feedback through effort attributions

Hypothesis 2: There will be a negative indirect effect of observed performance on strategy-oriented feedback through ability attributions

Hypothesis 3: There will be a negative indirect effect of observed performance on comfort-oriented feedback through effort attributions

Hypothesis 4: There will be a positive indirect effect of observed performance on comfort-oriented feedback through ability attributions

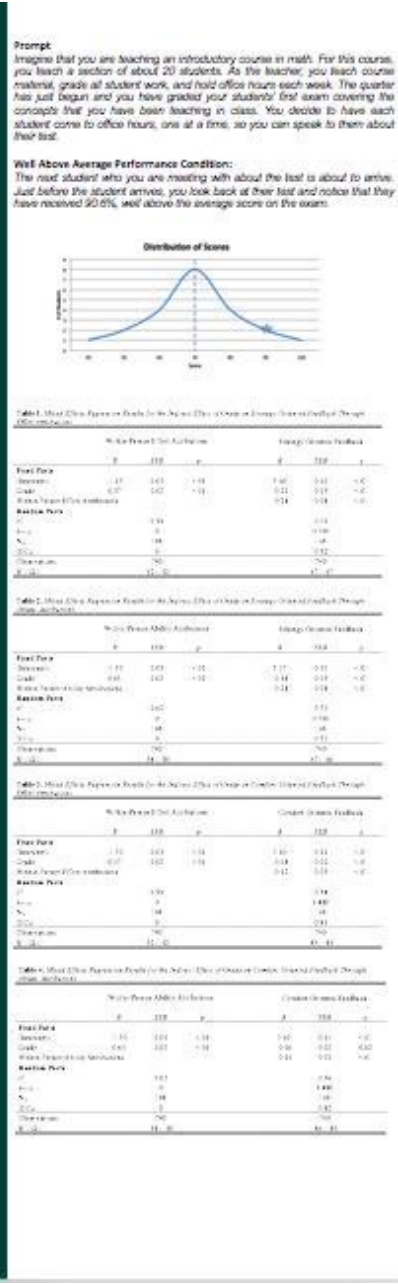
RESULTS & DISCUSSION

- All hypotheses were supported by significant indirect effects
- Observing higher performance leads to higher effort and ability attributions which leads to lower strategy- and comfort-oriented feedback
- Observing lower performance leads to lower effort and ability attributions which leads to higher strategy- and comfort-oriented feedback
- Attributions act as a causal mechanism by which individuals respond to different levels of performance
- Teachers do not believe that feedback could help improve or maintain performance for high performing students
- Teachers attribute poor performance to lower ability and effort, causing teachers to offer both comfort- and strategy-oriented feedback
- Practitioners should encourage feedback givers to continue to provide feedback to those perceived to have high ability and effort in order to maintain successful developmental relationships

SAINT LOUIS UNIVERSITY
EST. 1818

Attributions are a **causal mechanism** linking **performance** to **feedback.**

Take a picture to **download the full paper**



Prompt

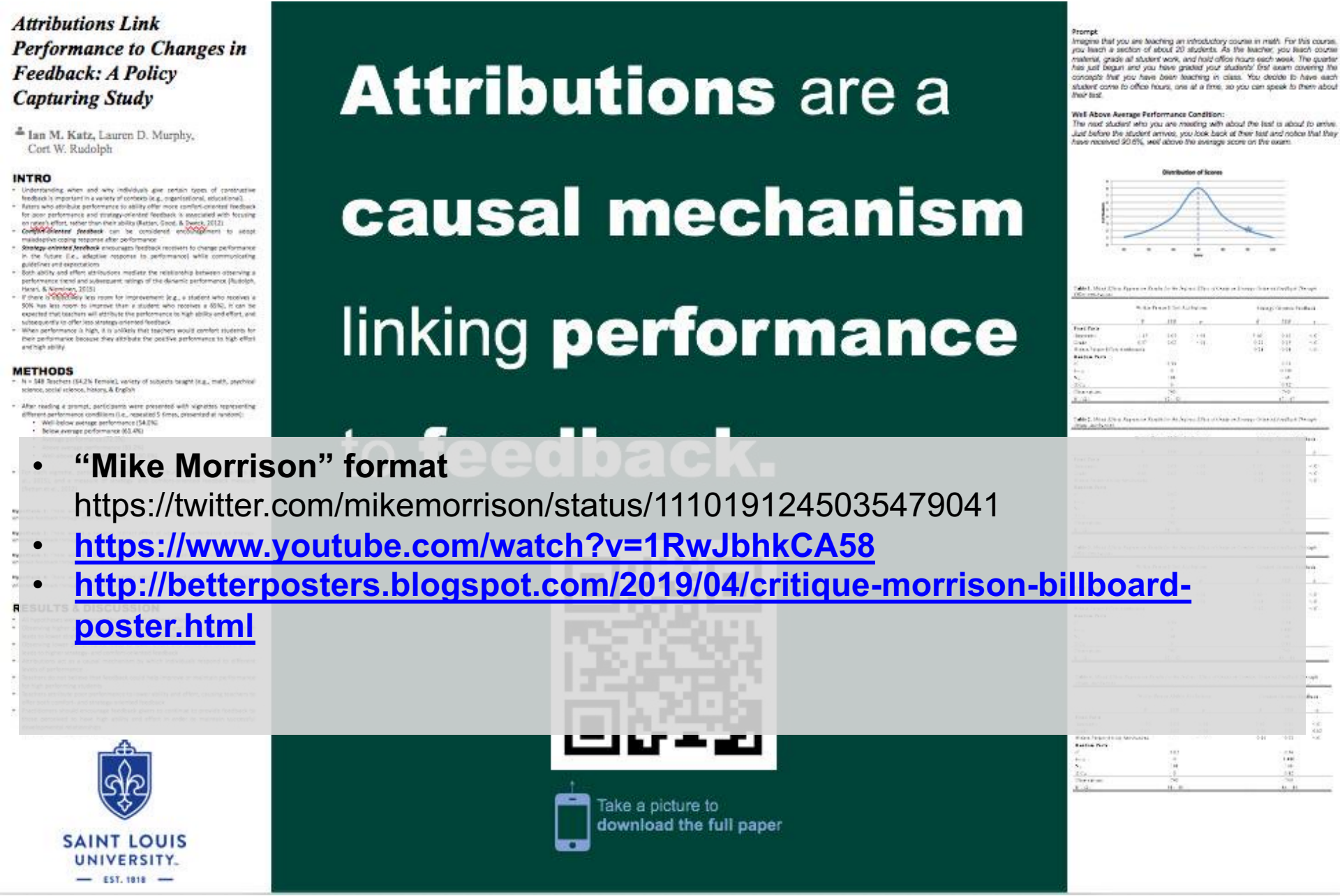
Imagine that you are teaching an introductory course in math. For this course, you teach a section of about 20 students. As the teacher, you teach course material, grade all student work, and hold office hours each week. The quarter has just begun and you have graded your students' first exam covering the concepts that you have been teaching in class. You decide to have each student come to office hours, one at a time, so you can speak to them about their test.

Well Above Average Performance Condition:

The next student who you are meeting with about the test is about to arrive. Just before the student arrives, you look back at their test and notice that they have received 90.6%, well above the average score on the exam.

Distribution of Scores

https://twitter.com/CortRudolph/status/1110605730980212737



- **"Mike Morrison" format**
  https://twitter.com/mikemorrison/status/1110191245035479041
- https://www.youtube.com/watch?v=1RwJbhkCA58
- http://betterposters.blogspot.com/2019/04/critique-morrison-billboard-poster.html

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