Designing and Presenting Your Scientific Poster

Presentation will begin at 12:30 PM (Pacific)

Clinical Research Education Series 2021

ITHS | Institute of Translational Health Sciences
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UNIVERSITY of WASHINGTON

FRED HUTCH
CURES START HERE®

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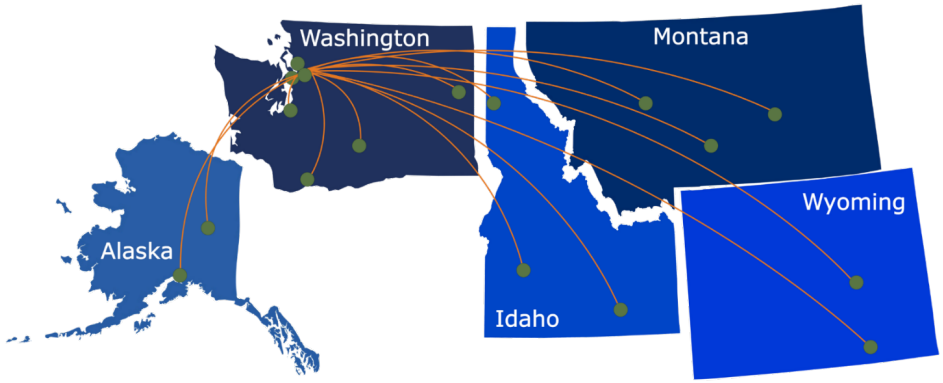
HOSPITAL · RESEARCH · FOUNDATION



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Contact our **Director of Research Development**

- **Project Consultation**
- **Strategic Direction**
- **Resources and Networking**

Melissa D. Vaught, Ph.D.
ithsnav@uw.edu
206.616.3875

Feedback

At the end of the seminar, a link to the feedback survey will be sent to the email address you used to register.

Clinical Research Education Series 2021

Designing and Presenting Your Scientific Poster

Presented by: Michael Louella

Community Engagement Project Manager/defeatHIV
Outreach Coordinator/UW ACTU
Community Liaison / UW Fred Hutch CFAR

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Learning Objectives

1. List three design choices to make my poster more engaging to increase the effectiveness of my message.

2. Describe two suggestions how to make the presentation of my poster more impressive and compelling.

OUTLINE

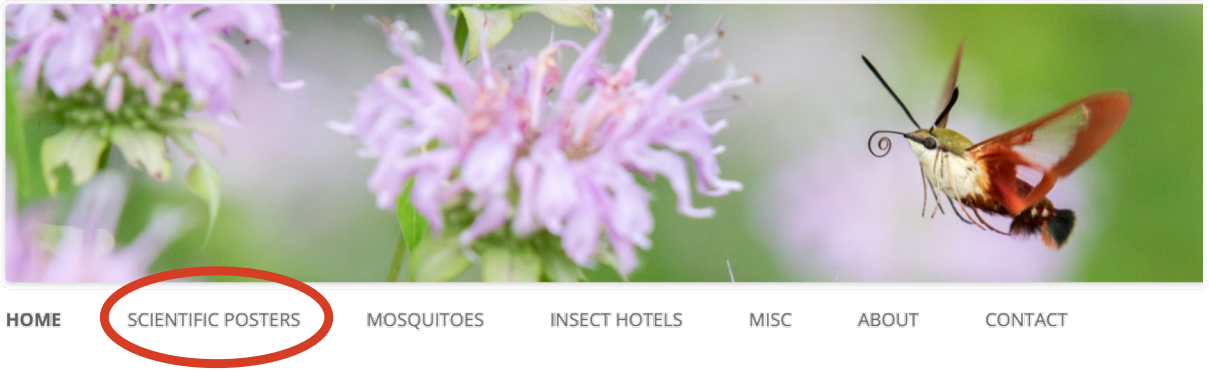
1. CREDIT
2. WHAT IS A POSTER?
3. WHAT TO PUT IN EACH SECTION?
4. DOs AND DON'Ts
5. HOW TO MAKE YOUR POSTER MORE ENGAGING
6. HOW TO PRESENT A POSTER
7. PRACTICE TIME!
8. DISCUSSION

ALL CREDIT IS DUE TO…

COLIN PURRINGTON

https://colinpurrington.com/

a blog with nature photography, biology-related projects, & geeky tips



Purrington, C.B. Designing conference posters. Retrieved 2021-04-11 from https://colinpurrington.com/tips/poster-design.


every
detail

WHAT IS A POSTER?

WHAT IS A POSTER?

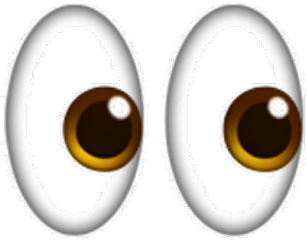
a networking tool

attract attention

conversation starter

a communication tool

visuals draw people in



scientific poster = ***visual abstract***

accessible drive attention

TOPIC PITCHED AT A GENERAL AUDIENCE

GIVES CONCLUSION OR AT LEAST HINTS AT SOMETHING INTERESTING

INTRO

3 SENTENCES MAX

PERSUADE VIEWER YOU HAVE NOVEL QUESTION/HYPOTHESIS

METHODS

3 SENTENCES MAX

IF VIEWER WANTS THE GRUESOME DETAILS, THEY'LL ASK

RESULTS

HIGHLIGHT YOUR LARGE PHOTOGRAPHS, CHARTS, MAPS, ETC. IN THIS CENTRAL ARENA.

DON'T INCLUDE EVERY GRAPHIC YOU'VE MADE THAT RELATES TO PROJECT. CHOOSE ONE. OR TWO.

AND SEPARATE GRAPHICS WITH PLENTY OF BLANK SPACE.

CONCLUSION

EXPLAIN WHY OUTCOME IS INTERESTING

MAYBE INCLUDE A SENTENCE ABOUT WHAT YOU PLAN TO DO NEXT

LIT. CITED

Author, J. 2012. Article title. *Journal of Something* 1:1–2.

ACKNOWLEDGEMENTS

BE BRIEF.

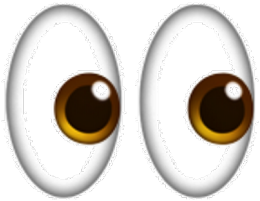
FURTHER INFO

TOPIC PITCHED AT A GENERAL AUDIENCE
GIVES CONCLUSION OR AT LEAST HINTS AT SOMETHING INTERESTING

needs to be **catchy**

approximately
1-2 lines

in order to reel in passersby



who are trying to avoid

boring interactions

a real danger at conferences **just like in the real world**

target an intelligent person who is **not in your field**

INTRO

3 SENTENCES MAX

PERSUADE VIEWER YOU HAVE NOVEL QUESTION/HYPOTHESIS

assume they are predisposed to find your topic **unimportant**

First sentence or two get your viewer ***interested***
in the issue or question that drove you

Use the absolute minimum of **background information, definitions,** and **acronyms** (all of which *are boring*)

a photograph or illustration
that visually communicates some aspect of your research question

approximately
200 words

METHODS

3 SENTENCES MAX

IF VIEWER WANTS THE GRUESOME DETAILS, THEY'LL ASK

Briefly describe experimental equipment and procedure, but not with the detail used for a manuscript.

Use **figures** and **flow charts** to illustrate experimental design if possible.

Mention statistical analyses that were used and how they allowed you to address hypothesis.

approximately

200 words

1st ¶

mention
whether your experiment procedure *actually worked*

briefly describe
qualitative and descriptive results to give a more personal tone

approximately
200 words
(not counting figure legends)

always the largest section
(except if you have no data)

RESULTS

HIGHLIGHT YOUR LARGE PHOTOGRAPHS, CHARTS, MAPS, ETC. IN THIS CENTRAL ARENA.

DON'T INCLUDE EVERY GRAPHIC YOU'VE MADE THAT RELATES TO PROJECT. CHOOSE ONE. OR TWO.

AND SEPARATE GRAPHICS WITH PLENTY OF BLANK SPACE.

use figure legends
that convey some point to reader even if they skipped all other sections

2nd ¶

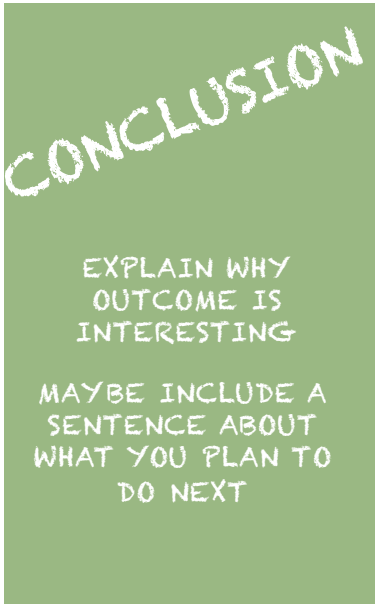
begin presentation of data analysis
that more specifically addresses your hypothesis.

refer to
supporting charts or images

figures over tables
whenever possible

remind the reader
without sounding like you are reminding the reader, of the major result

quickly state
whether your hypothesis was supported.



try to convince the visitor
why the outcome is interesting
(assume they've skipped the Intro)

state the relevance
of your findings to other published work

add relevance
to real organisms in the real world

add sentence
on future directions of research

approximately
200 words

follow format exactly

grammar/typography police

at conferences will find even minor infractions

thank individuals **specific contributions**

equipment donation
statistical advice
lab assistance
comments on earlier versions

mention **funding**

also any **conflicts of interest**

free space to provide:

your e-mail address

your web site address

a URL

download PDF version of poster

logos

LIT. CITED

Author, J. 2012. Article title. *Journal of Something* 1:1–2.

ACKNOWLEDGEMENTS

BE BRIEF.

FURTHER INFO

TOPIC PITCHED AT A GENERAL AUDIENCE GIVES CONCLUSION OR AT LEAST HINTS AT SOMETHING INTERESTING

INTRO

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PERSUADE VIEWER YOU HAVE NOVEL QUESTION/HYPOTHESIS

METHODS

3 SENTENCES MAX

IF VIEWER WANTS THE GRUESOME DETAILS, THEY'LL ASK

RESULTS

HIG … GE
PHOTO … ETC.
I…

DON'T … U'VE
MA…

AND SEP… …Y OF

ABSTRACT

???

CONCLUSION

EXPLAIN WHY OUTCOME IS INTERESTING

MAYBE INCLUDE A SENTENCE ABOUT WHAT YOU PLAN TO DO NEXT

LIT. CITED

Author, J. 2012. Article title. *Journal of Something* 1:1–2.

ACKNOWLEDGEMENTS

BE BRIEF.

FURTHER INFO

DOs & DON'Ts

some tips to avoid producing a terrible poster

#1 TOO WORDY

1000 words
or less

700 words
body text

300 words
figures/tables

DOs & DON'Ts

some tips to avoid producing a terrible poster

#2 TOO CRAMPED

a failure to keep
a pleasing amount
of blank space
around text boxes
and figures

DOs & DON'Ts

TITLES

Avoid **titles with colons** if you can: they are overused

if you must → ***don't spill onto 3rd line***

Format in **sentence case**

capitalization
italicization

trade names
Latin binomials

gene names
allele names

Use **a non-serif font** (e.g., Helvetica) for title and headings and a serif font (e.g., Palatino) for body text

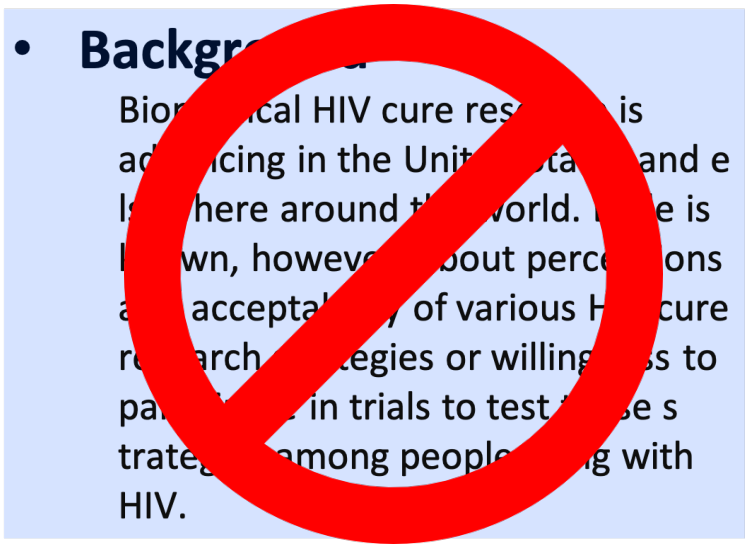
DOs & DON'Ts

SECTIONS

Do not add bullets to section headings ***use bolded, larger font***

Background

Biomedical HIV cure research is advancing in the United States and elsewhere around the world. Little is known, however, about perceptions and acceptability of various HIV cure research strategies or willingness to participate in trials to test these strategies among people living with HIV.



DOs & DON'Ts

SECTIONS

The width of text boxes should be approximately 45-65 characters. Lines that are shorter or longer are harder to read quickly.

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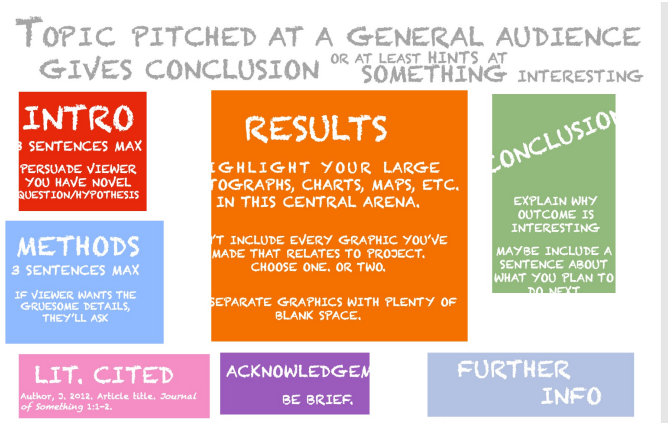
DOs & DON'Ts

SECTIONS

Don't vary the width of text boxes

Use ***lists of sentences*** rather than *blocks of text*

Use ***italics*** instead of <u>underlining</u>



When using acronyms & numbers, **scale down the font size** by a couple of points so sizes don't overpower lowercase text

DOs & DON'Ts

SECTIONS

Correct any **errors in spacing** wit hin and between words, especially before and after *italicized* text.

Use only **single space** between sentences

Avoid **dark backgrounds** for text boxes

Dark text on light = **easier**

Dark background = **designing graphics harder**

DOs & DON'Ts

SECTIONS

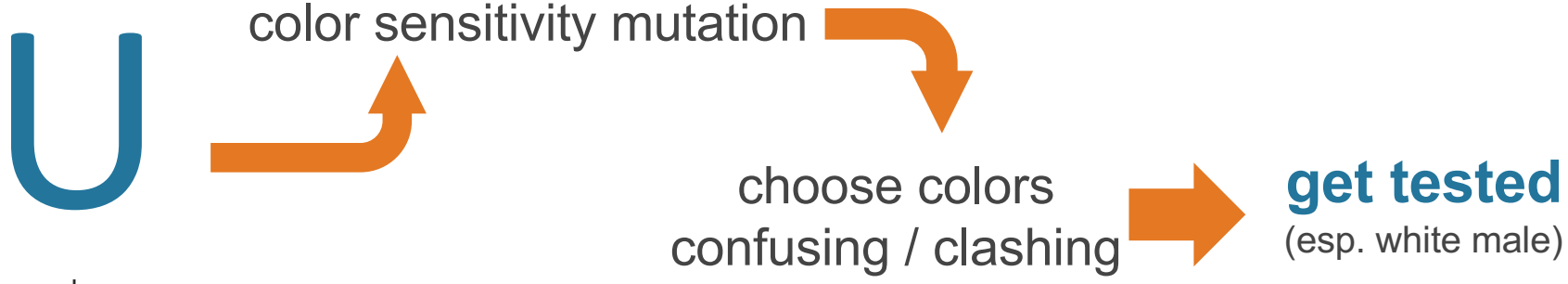
Coblis

Avoid color combinations that create problems for those with color-deficient alleles

built-in simulator
Photoshop

*avoid **red & green** together*

*use **symbols & line patterns** for graph elements*



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DOs & DON'Ts

GRAPHS & TABLES

Give your graphs **titles** or **informative phrases**

manuscripts → no

posters → guide the visitor

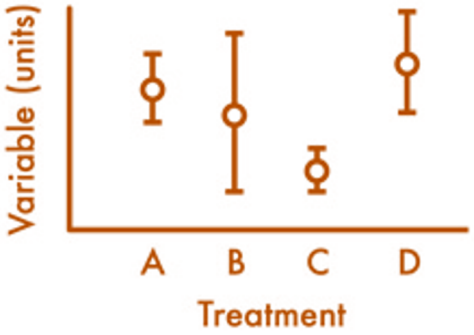
add small **illustrations** to your graphs & tables

help attract and inform viewers
more effectively than text alone

DOs & DON'Ts

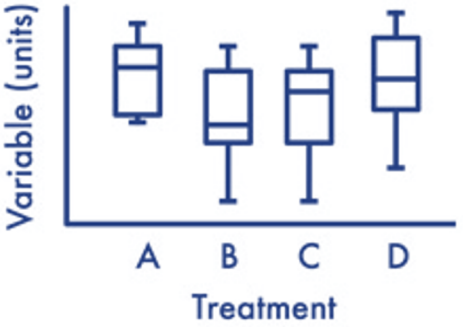
GRAPHS & TABLES

Choose the right graph



line plots

to show means (=averages)



box plots

to display medians

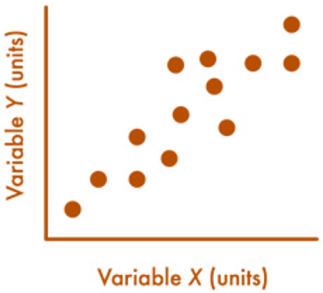
(when one or more groups have non-normally distributed data)

Purrington, C.B. Watch your figures. Retrieved 2021-04-21 from https://colinpurrington.com/tips/figures.

DOs & DON'Ts

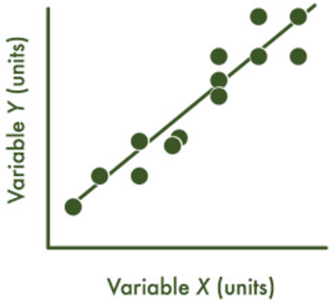
GRAPHS & TABLES

Choose the right graph



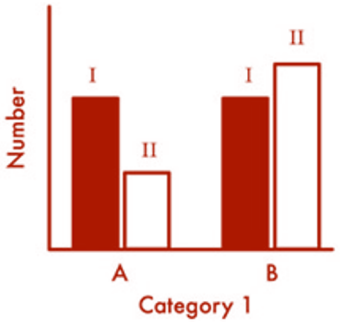
scatterplots

to show relationships (correlations) between continuous variables



regression plots

to display how one variable causes variation in a second variable



bar graphs

to show count (=discrete, discontinuous) data.

DOs & DON'Ts

GRAPHS & TABLES

Directly label the different graph elements (no keys)

Use general, descriptive terms, even if they require more space
no acronyms or other shorthand

Align Y-axis labels horizontally → much easier to read

Format axis labels in **sentence case**

Purrington, C.B. Watch your figures. Retrieved 2021-04-21 from https://colinpurrington.com/tips/figures.

DOs & DON'Ts

GRAPHS, GRAPHICS & TABLES

Never use **colored backgrounds, grid lines,** or **boxes**

Never display two-dimensional data in 3-D

Details on graphs/photographs viewed **from 6 feet away**

Add a **thin gray / black border** to make photographs stand out against background color

Purrington, C.B. Watch your figures. Retrieved 2021-04-21 from https://colinpurrington.com/tips/figures.

DOs & DON'Ts

GRAPHS, GRAPHICS & TABLES

Provide **the source** of any image that is not yours

Use web graphics with **caution**

TIFFs **PNGs** 

If you can't find the perfect illustration or photograph for your poster, ***get one made.***

Purrington, C.B. Watch your figures. Retrieved 2021-04-21 from https://colinpurrington.com/tips/figures.

DOs & DON'Ts

Don't clutter the top of your poster with ***logos***

Put logos at the top of your poster to ruin poster aesthetics, reduce legibility of title, and undermine the ability of your graphs to visually compete for viewers' attention

Colin Purrington
666 Teipai Street, Posterville, PA 19801, USA

Introduction

Your reader was mildly intrigued by the title, but you have exactly two sentences to hook them into reading more. So describe exactly what your interesting question is and why it really needed to be addressed. Gratuitous background information will cause them to walk away.

Typography research has shown that text is easier to read if you use a serif font such as Times. But use a non-serif font for title, headings, etc., to subtly tag them as different. Research has also shown that fully justified text (like this paragraph) is harder to read, so don't do this, even if it seems cool and professional looking.

Materials and methods

Few people really want to know the gruesome details of what you've been up to, so be brief. And be visual. Use a photograph, drawing, or flow chart if possible, supplemented with only a brief overview of your procedure.

If you can somehow attach an object, an iPad, etc., that

Results

The overall layout in this arena should be visually compelling, with clear cues on how a reader should travel through the components. You might want a large map with inset graphs. Or have questions on left and answers with supporting graphs on right. Be sure to separate figures from other figures by generous use of white space. When figures are too cramped, viewers get confused about which figures to read first and which legend goes with which figure. Cramped content just looks bad, too. The big thing to remember is that a Results section on a poster does not need to look like a Results section on a manuscript, so feel free to be creative.

If you can add small drawings or icons to your figures, do so — those visual cues can be priceless aids in orienting viewers. And use colored arrows or callouts to focus attention on important parts of graphs. You can even put text annotations next to arrows to tell reader what's going on that's interesting in relation to the hypothesis test. E.g., "This outlier was most likely caused by contamination when I sneezed into tube." Also, don't be afraid of using colored connector lines to show how one part of a figure relates to another figure.

Figures are preferred but tables are sometimes unavoidable, like death. If you must include one, go to great efforts to make it look professional (the table, that is). Look in a respectable journal and emulate the layout, line types, line thickness, text alignment, etc., exactly. A table looks best when it is first composed within Microsoft Word, then inserted as an Object. Use colored text or arrows to draw attention to important parts of the

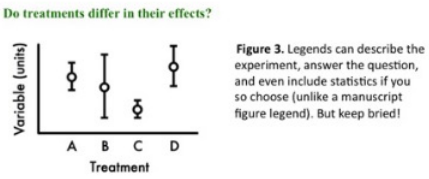


Figure 3. Legends can describe the experiment, answer the question, and even include statistics if you so choose (unlike a manuscript figure legend). But keep bried!

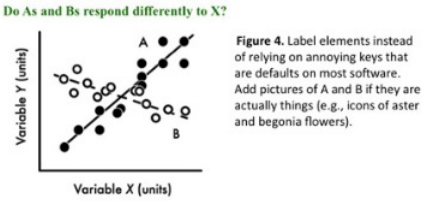


Figure 4. Label elements instead of relying on annoying keys that are defaults on most software. Add pictures of A and B if they are actually things (e.g., icons of aster and begonia flowers).

Conclusions

Conclusions should not be mere reminders of your results—that would be boring. You want to guide the reader through what you have *concluded* from the results, and you need to make the first several sentences understandable on their own and interesting…because many conference attendees will start reading this section first. If you don't hook them, they'll walk. These first several sentences should refer back, explicitly, to the burning issue mentioned in the introduction. (If you didn't mention a burning issue in the introduction, go back and fix that.)

A good conclusion will also explain how your conclusions fit into the literature on the topic. E.g., how exactly does your research add to what is *already* published on the topic? It's important to be humble and generous in this section, so assume that authors of previous literature may be at the conference, and further assume they are crabby and influential. You can also draw upon less formal types of context such as conversations you have had with smart and important people (God, personal communication).

Finally, you want to tell readers who have lasted this long what needs to be done next, and who should do it. E.g., are you taking the next logical step, or should another discipline follow up on your amazing result? It's OK to put a bit of personality into this ending because viewers expect posters to be personal, and if you're not actually standing their to convey your enthusiasm, your poster should be doing that for you.

TIME TO PRACTICE!

"THE TERRIBLE POSTER"

We will separate you into 4 groups.

Once in your groups, **choose one person** to write the group's answers.

Using what we've discussed about poster design, **find everything that is wrong** with the following poster.

(And trust me, *everything* is wrong with this poster!)

For each error your group identifies, be certain to include **how you would fix it** to improve this terrible poster.

why is this a terrible poster?

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.

LITERATURE CITED:

NASA. 1982. Project STS-XX: Guinea Pigs. Leaked internal memo.

Sekulić, S.R., D. D. Lukač, and N. M. Naumović. 2005. The Fetus Cannot Exercise Like An Astronaut: Gravity Loading Is Necessary For The Physiological Development During Second Half Of Pregnancy. Medical Hypotheses. 64:221-228

Xavier, M. 1965. Elastane Purchases Accelerate Weight Gain In Case-control Study. Journal of Obesity. 2:23-40.

why is this a terrible poster?

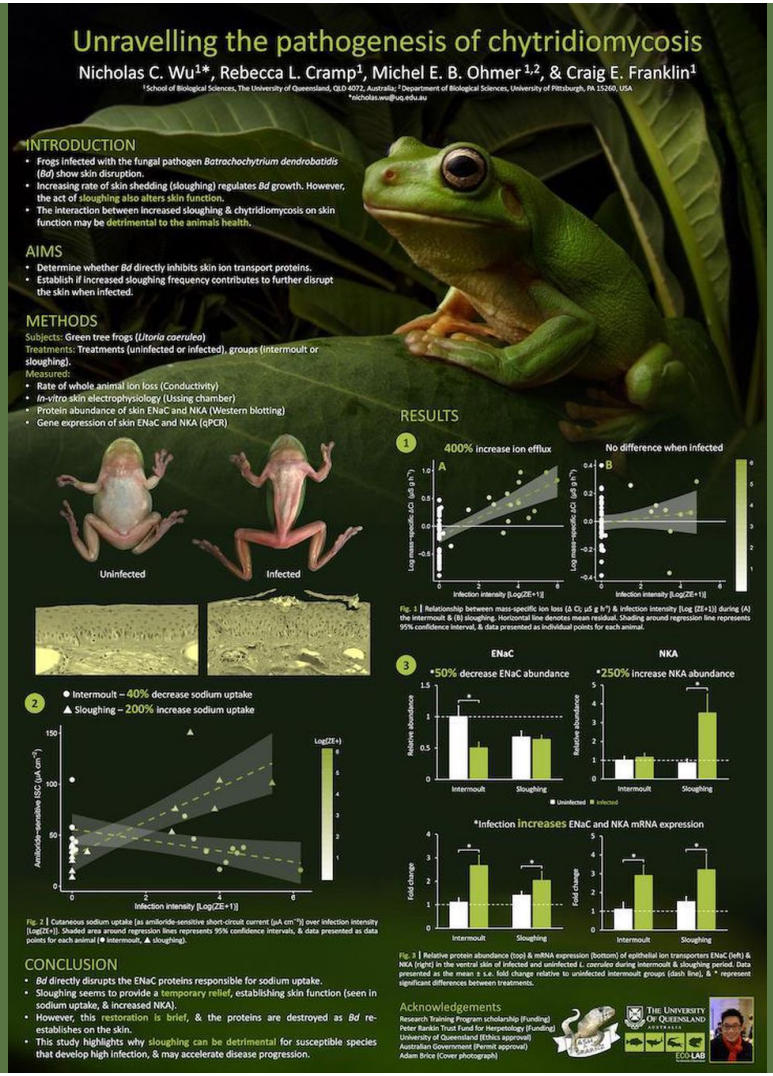
WHY THIS IS A TERRIBLE POSTER

- **Too much text** (800 words or less).
- **Background image is distracting** (distracts from illustrations).
- **Text box backgrounds are dark**, which makes text really hard to read.
- **Text box backgrounds are all different colors** (distracting).
- **Text boxes are different widths** (distracting, hard to follow flow of poster).
- **Some text boxes too wide** (aim for 45-65 characters per line).
- **Text boxes not separated from each other by pleasing "neutral" space**.
- **Text box edges not aligned** (distracting).
- **Text justified,** which causes bad inter-word spacing. Also makes reading harder (brain *uses* jaggedness of left-justified text).
- **Logos are distracting,** useless, crowd title.
- **Title word art distracting**, hard to read, juvenile.

WHY THIS IS A TERRIBLE POSTER

- **Title is in all caps**, which is harder to read *and* obscures Latin name.
- **Title is italicized**, which *also* obscures Latin name style conventions.
- **Author font and color is annoying** (comic sans should be reserved for comic books).
- **Author font color is too loud relative to other text.**
- **Results are presented in sentences** instead of visually with charts.
- **Section headers have too much formatting** (big font, bolded, italicized, underlined, *and* colored — ack!). Choose one. [Note: numbering the sections…that would have been even worse.]
- **Terrible graphic of Guinea pig on scale**. Need one of the actual set up (pigs eating while weightless, for example).
- **Inclusion of an Abstract consumes space needlessly**. Abstract section should be banned from posters. Posters ARE an abstract.
- **Plus the science is terrible!** *(Bad science is correlated with bad graphic design, by the way.)*

INSPIRATION



Unravelling the pathogenesis of chytridiomycosis

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INTRODUCTION

- Frogs infected with the fungal pathogen *Batrachochytrium dendrobatidis* (*Bd*) show skin disruption.
- Increasing rate of skin shedding (sloughing) regulates *Bd* growth. However, the act of sloughing also alters skin function.
- The interaction between increased sloughing & chytridiomycosis on skin function may be detrimental to the animals health.

AIMS

- Determine whether *Bd* directly inhibits skin ion transport proteins.
- Establish if increased sloughing frequency contributes to further disrupt the skin when infected.

METHODS

Subjects: Green tree frogs (*Litoria caerulea*)
Treatments: Treatments (uninfected or infected), groups (intermoult or sloughing).
Measured:

- Rate of whole animal ion loss (Conductivity)
- *In-vitro* skin electrophysiology (Ussing chamber)
- Protein abundance of skin ENaC and NKA (Western blotting)
- Gene expression of skin ENaC and NKA (qPCR)

Uninfected Infected

2 ● Intermoult – 40% decrease sodium uptake
▲ Sloughing – 200% increase sodium uptake

Amiloride-sensitive ISC (μA cm⁻²)
Infection intensity [Log(ZE+1)]
Log(ZE+)

Fig. 2 | Cutaneous sodium uptake [as amiloride-sensitive short-circuit current (μA cm⁻²)] over infection intensity [Log(ZE+1)]. Shaded area around regression lines represents 95% confidence intervals, & data presented as data points for each animal (◆ intermoult, ▲ sloughing).

CONCLUSION

- *Bd* directly disrupts the ENaC proteins responsible for sodium uptake.
- Sloughing seems to provide a temporary relief, establishing skin function (seen in sodium uptake, & increased NKA).
- However, this restoration is brief, & the proteins are destroyed as *Bd* re-establishes on the skin.
- This study highlights why sloughing can be detrimental for susceptible species that develop high infection, & may accelerate disease progression.

RESULTS

1 400% increase ion efflux — No difference when infected

A B
Log mass-specific ΔG (μS g h⁻¹)
Infection intensity [Log(ZE+1)]

Fig. 1 | Relationship between mass-specific Ion loss (Δ G; μS g h⁻¹) & infection intensity [Log (ZE+1)] during (A) the intermoult & (B) sloughing. Horizontal line denotes mean residual. Shading around regression line represents 95% confidence interval, & data presented as individual points for each animal.

3 ENaC — NKA
*50% decrease ENaC abundance — *250% increase NKA abundance
Relative abundance
Intermoult Sloughing
■ Uninfected ■ Infected

*Infection increases ENaC and NKA mRNA expression
Fold change
Intermoult Sloughing

Fig. 3 | Relative protein abundance (top) & mRNA expression (bottom) of epithelial ion transporters ENaC (left) & NKA (right) in the ventral skin of infected and uninfected *L. caerulea* during intermoult & sloughing period. Data presented as the mean ± s.e. fold change relative to uninfected intermoult groups (dash line), & * represent significant differences between treatments.

Acknowledgements
Research Training Program scholarship (Funding)
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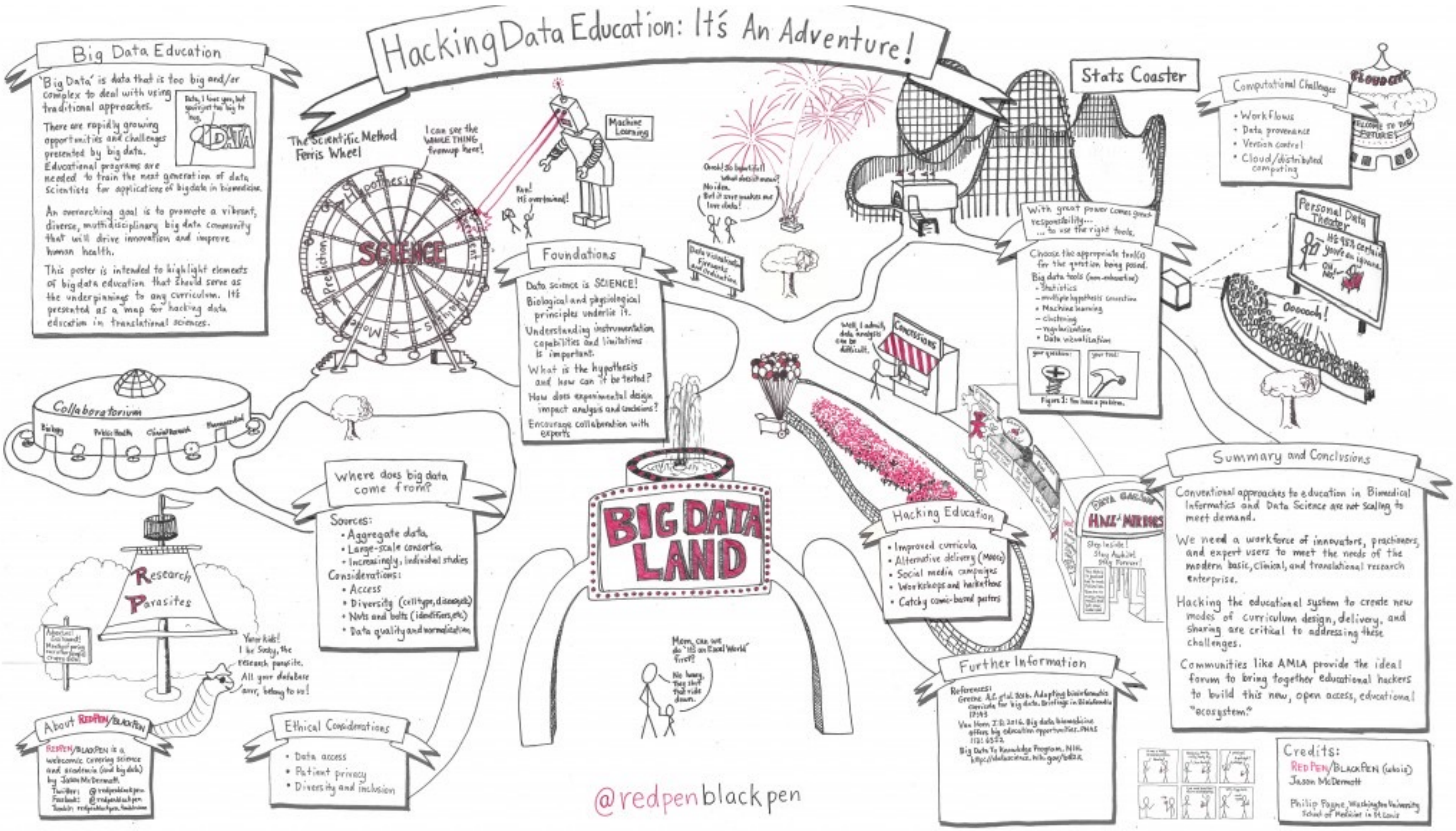
Australian Government (Permit approval)
Adam Brice (Cover photograph)

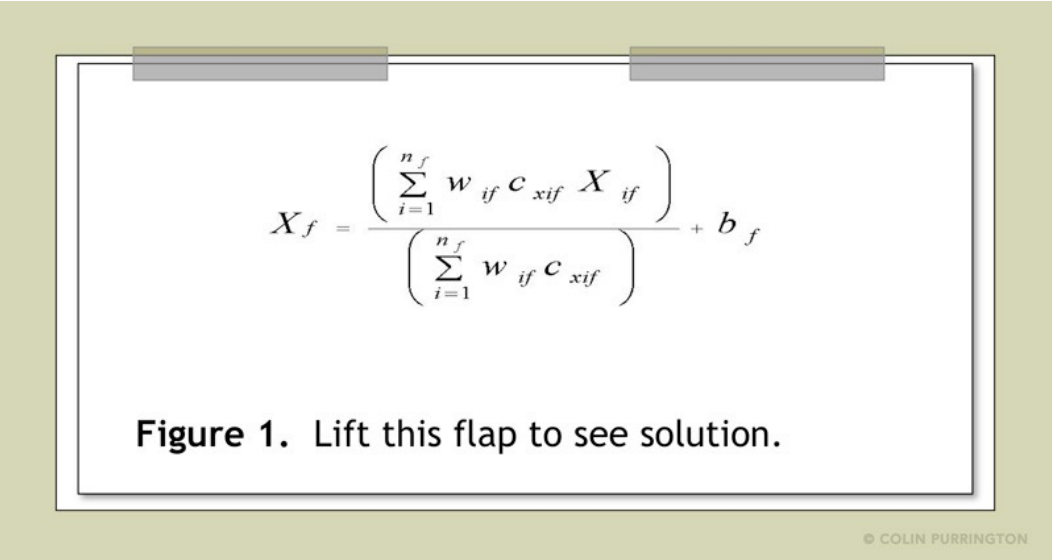
THE UNIVERSITY OF QUEENSLAND AUSTRALIA
ECO-LAB


Hacking Data Education: It's An Adventure!
Big Data Education
'Big Data' is data that is too big and/or complex to deal with using traditional approaches.
There are rapidly growing opportunities and challenges presented by big data.
Educational programs are needed to train the next generation of data scientists for applications of big data in biomedicine.
An overarching goal is to promote a vibrant, diverse, multidisciplinary big data community that will drive innovation and improve human health.
This poster is intended to highlight elements of big data education that should serve as the underpinnings to any curriculum. It's presented as a map for hacking data education in translational sciences.
DATA
The Scientific Method Ferris Wheel
I can see the WHOLE THING from up here!
SCIENCE
Hypothesis
Experiment
Prediction
Machine Learning
Foundations
Data science is SCIENCE!
Biological and physiological principles underlie it.
Understanding instrumentation capabilities and limitations is important.
What is the hypothesis and how can it be tested?
How does experimental design impact analysis and conclusions?
Encourage collaboration with experts
Ooooh! So beautiful! What does it mean?
No idea. But it sure makes me love data!
Data Visualization Fireworks and Ordination
Stats Coaster
With great power comes great responsibility... ...to use the right tools.
Choose the appropriate tool(s) for the question being posed.
Big data tools (non-exhaustive)
- Statistics
- multiple hypothesis correction
• Machine learning
- clustering
- regularization
• Data visualization
your question:
your tool:
Figure 1: You have a problem.
Computational Challenges
• Workflows
• Data provenance
• Version control
• Cloud/distributed computing
WELCOME TO THE FUTURE!
Personal Data Theater
It's 95% certain you're an iguana.
Oh No!
Oooooh!
Well, I admit, data analysis can be difficult.
CONCESSIONS
Collaboratorium
Biology
Public Health
Clinical Research
Where does big data come from?
Sources:
• Aggregate data
• Large-scale consortia
• Increasingly, individual studies
Considerations:
• Access
• Diversity
• Nuts and bolts (identifiers, etc.)
• Data quality and normalization
Research Parasites
Yarr kids! I be Seaby, the research parasite. All your database arrr, belong to us!
BIG DATA LAND
Mom, can we do "It's an Excel World" first?
No honey, they shut that ride down.
Hacking Education
• Improved curricula
• Alternative delivery (MOOCs)
• Social media campaigns
• Workshops and hackathons
• Catchy comic-based posters
HALL of MIRRORS
Step Inside! Stay Awhile! Stay Forever!
Summary and Conclusions
Conventional approaches to education in Biomedical Informatics and Data Science are not scaling to meet demand.
We need a workforce of innovators, practioners, and expert users to meet the needs of the modern basic, clinical, and translational research enterprise.
Hacking the educational system to create new modes of curriculum design, delivery, and sharing are critical to addressing these challenges.
Communities like AMIA provide the ideal forum to bring together educational hackers to build this new, open access, educational "ecosystem."
About REDPEN/BLACKPEN
REDPEN/BLACKPEN is a webcomic covering science and academia (and big data) by Jason McDermott
Twitter: @redpenblackpen
Facebook: @redpenblackpen
Ethical Considerations
• Data access
• Patient privacy
• Diversity and inclusion
@redpenblackpen
Further Information
References:
Greene A.C. et al. 2016. Adapting bioinformatics curricula for big data. Briefings in Bioinformatics 17:43
Van Horn J.D. 2016. Big data biomedicine offers big education opportunities. PNAS 113:6322
Big Data To Knowledge Program, NIH. https://datascience.nih.gov/bd2k
Credits:
REDPEN/BLACKPEN (comic)
Jason McDermott
Philip Payne, Washington University School of Medicine in St. Louis


YOUR POSTER IS YOURS
FEEL FREE TO ADD OBJECTS TO INCREASE THE EFFECTIVENESS OF YOUR MESSAGE.
PEOPLE VISITING YOUR POSTER
PEOPLE REMEMBERING YOU

MORE ENGAGING

1. Add hidden panels



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

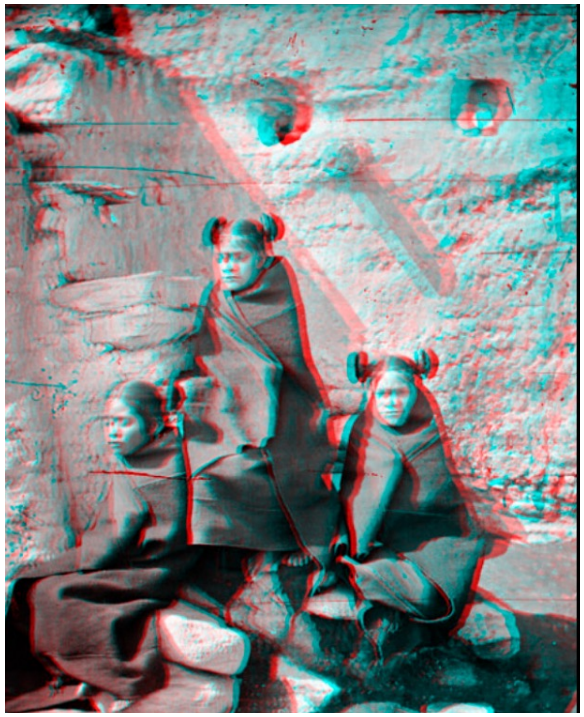
MORE ENGAGING

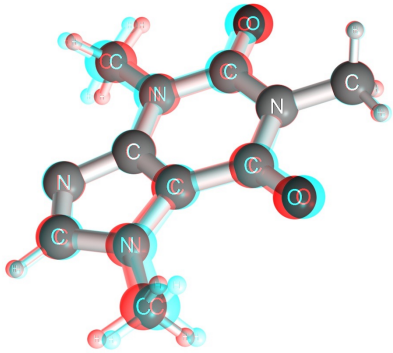
2. Add 3D images

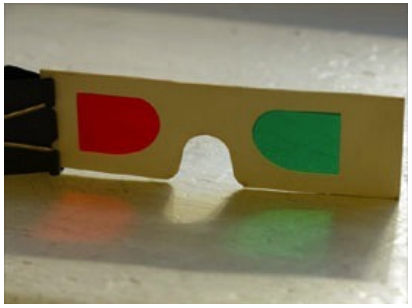
generate
stereoscopic images
viewable with
cheap 3-D glasses

a pouch near the figure so
that viewers can help
themselves to glasses

or attach glasses with string







http://jcrystal.com/steffenweber/gallery/stereo/stereo_image_gallery.htm

https://www.flickr.com/photos/themusicoflife/sets/72157594284858882/

MORE ENGAGING

3. Add objects

If your topic is related to a thing or object, **attach it.**

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

MORE ENGAGING

14. Add doodles

Use removable tape to add a transparency sheet over a graph or photograph if you want to make non-permanent doodles with Dry-Erase markers.

You can then doodle on critical parts of your poster, then erase.

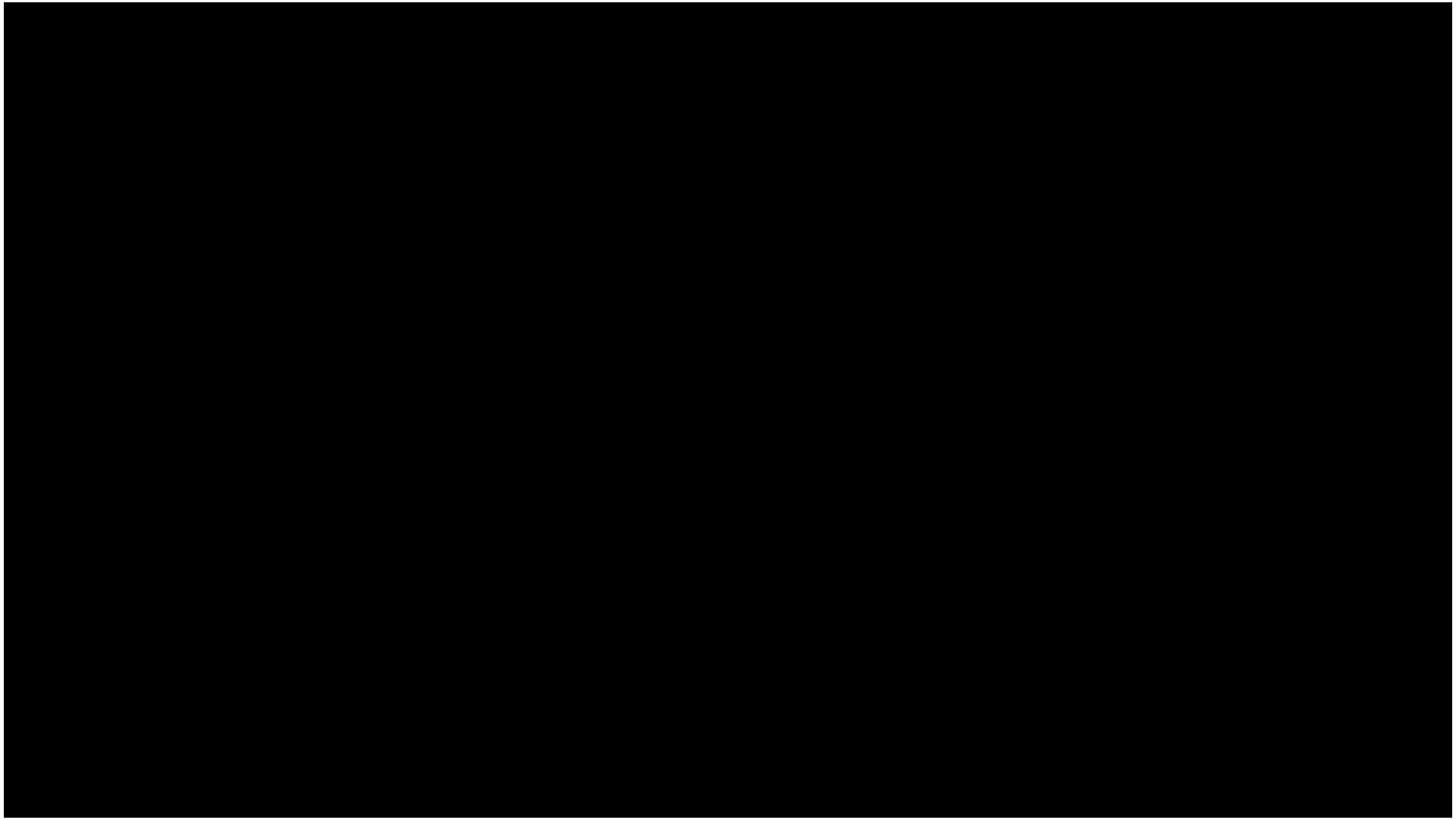
Or **add a frameless whiteboard tile**

MORE ENGAGING

15. Add slideshows and movies

If you wish to show movies
or photographs, **attach an iPad**


Bringing Community to Cure
Laurie Sylla, Erick Seelbach, Arjun Jay Kumar, Thomas Andrus and Michael Lowing
Results
Influencing Research
56,597
Are integrated members of collaboratory executive and scientific core committees
Provide feedback to researchers on study protocols, consents, recruitment and compensation policies
Engage in advocacy on timely issues
Engage in CAB self-education – attend scientific
Building trusting relationships with communities
Developing science/research literacy, development of skills and personal growth among CAB members
Creating a diverse CAB that ensures that input from people living with HIV is accounted for in all CAB decisions



MORE ENGAGING

6. Add sound

A cheap **“sound postcard”** will often do the trick if you don’t want to risk your iPad.

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

MORE ENGAGING

7. Add virtual reality content

Add virtual-reality content (and VR goggles) if you need a way to enhance the poster-viewing experience in some way.

https://www.cnet.com/news/this-vr-startup-wants-to-use-5g-to-blow-up-social-distancing//

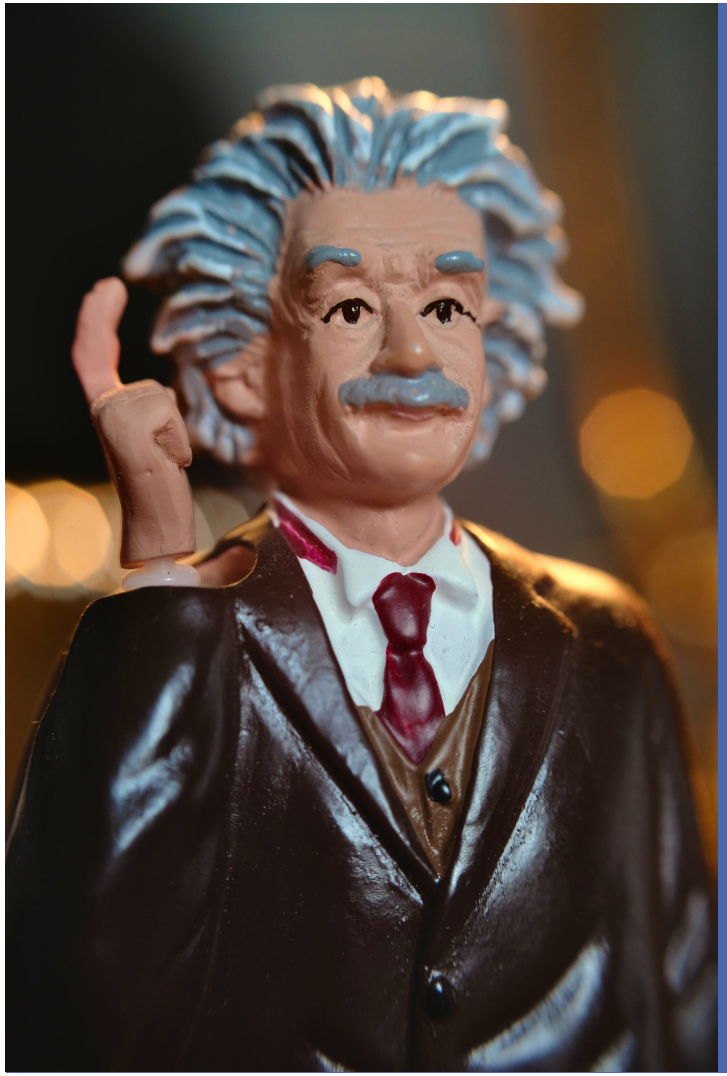
MORE ENGAGING

8. Add odors

Make your own **scratch-n-sniff** stickers.

Did you know that was possible?!

https://www.thecountrychiccottage.net/make-your-own-scratch-and-sniff-stickers/



HOW TO PRESENT YOUR POSTER

HOW TO PRESENT

A typical poster visitor appreciates **a 2-sentence overview** of why your research is interesting and relevant.

Get them hooked on **your *question*** before explaining anything more about your poster.

Keep it general, and make it clear to the visitor why ***you*** find the topic interesting.

HOW TO PRESENT

To see people presenting posters, there are **thousands of YouTube videos.**

"Poster Presentation Practice & Feedback"
https://youtu.be/RRpND47v84I

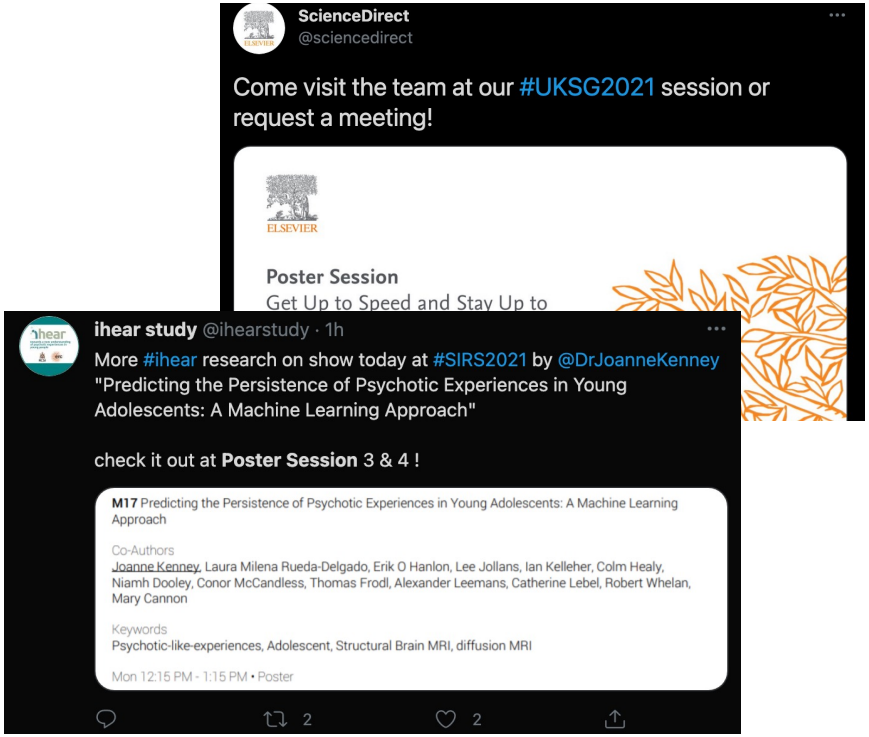
SACNAS | *Advancing Chicanos/Hispanics & Native Americans in Science*

ITHS | Institute of Translational Health Sciences
ACCELERATING RESEARCH. IMPROVING HEALTH.

HOW TO PRESENT

If your conference promotes a meeting hashtag (e.g., #geekfest19), **broadcast a short title and your poster's time and location on Twitter**

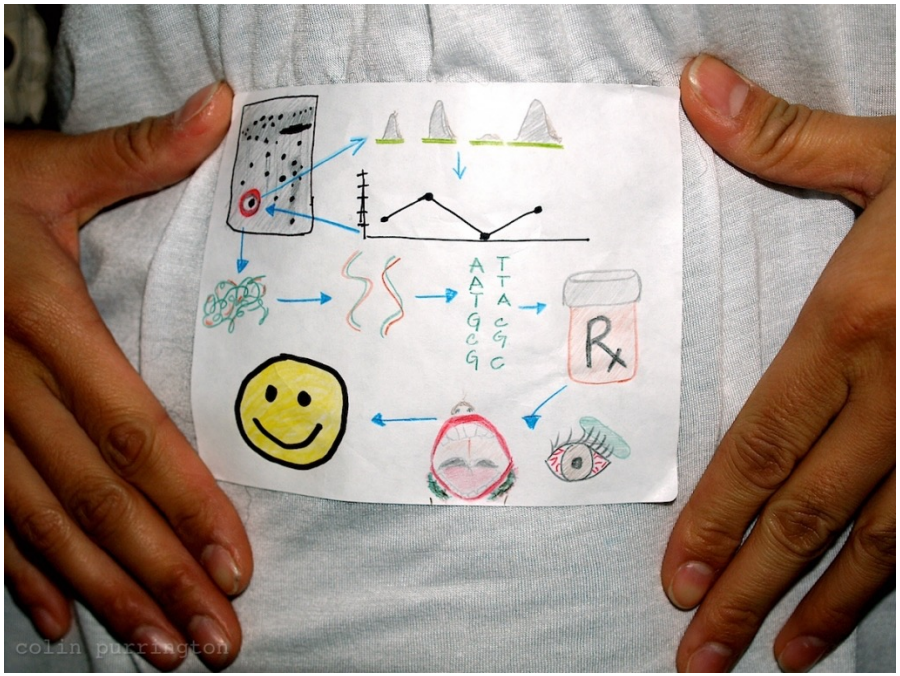
If your society hasn't advertised the official hashtag at least a year in advance, GENTLY nudge them to get on board with modernity.



HOW TO PRESENT

Attach a sketch of your research topic to yourself at the start of the meeting. Or a miniature version of your actual poster. 4×6″ sticker label paper is ideal..

Add text like, “Lincoln Conference Room, Fri @ 7pm”, so people know where/when to find you.



HOW TO PRESENT

Do not refer to notes when explaining your poster.

When presenting your poster, **use your fingers** to point out specific parts of your poster.

Avoid vagueness such as *"this figure shows our main result."* Say **something concrete,** like, "*We found that brainectomized rats finished the maze more slowly, as you can see from this graph that plots time…"*

HOW TO PRESENT

If more viewers arrive halfway into your spiel, **finish the tour** for the earlier arrivals first.

When in doubt about how to act at your poster, imagine that a viewer will be considering your application for a job ten years into the future, or will be considering your graduate school application next week.

HOW TO PRESENT

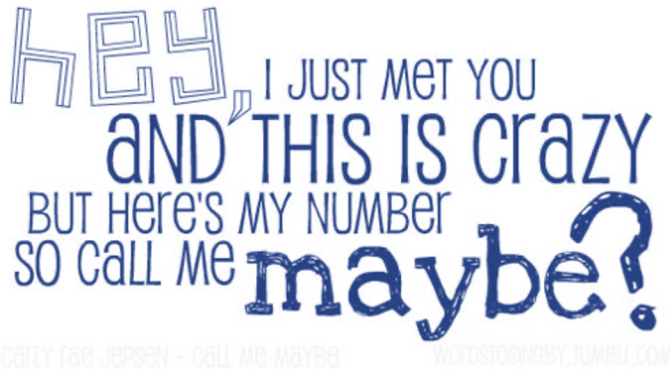
Attach a few business cards to your poster.

If you want to stay informal, just order yourself a stack of cards that feature photographs of whatever you work on.

HOW TO PRESENT

Attach a note alerting any viewers to your expected time of return or telling them where you can be found.

Put your phone number on the note. *"Hey, this is crazy, but if you want to chat about this poster, text me at 555-867-5309."*



HOW TO PRESENT

Attach a photograph of yourself near or on your poster so that people can find you more easily.

Have on hand **manuscripts and reprints** of your work.
If you have space on the mounting board,
just pin them up for the taking.

Or make **handouts of your poster**.

HOW TO PRESENT

If you have unpublished research, attach a **“Please do not photograph”** note to your poster.

Keep a black pen and correction fluid in your pocket in case a viewer discovers **an embarrassing typo**

HOW TO PRESENT

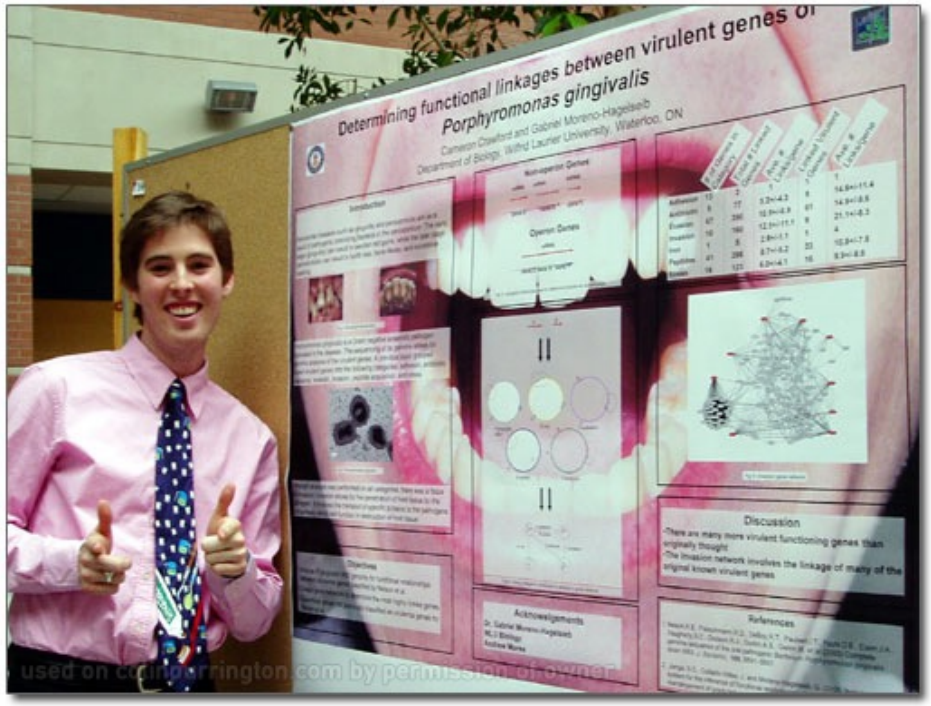
To lure viewers, **attach a clear plastic cup full of candy** to your poster along with a note saying, “please help yourself.”

Stand off to the side of your poster, then swoop back in when victims take the bait.

https://www.leadertelegram.com/news/front-page/candy-food-truck-student-research-examines-feasibility/article_c1ff4adf-ac89-5c49-934d-2f3f08924492.html

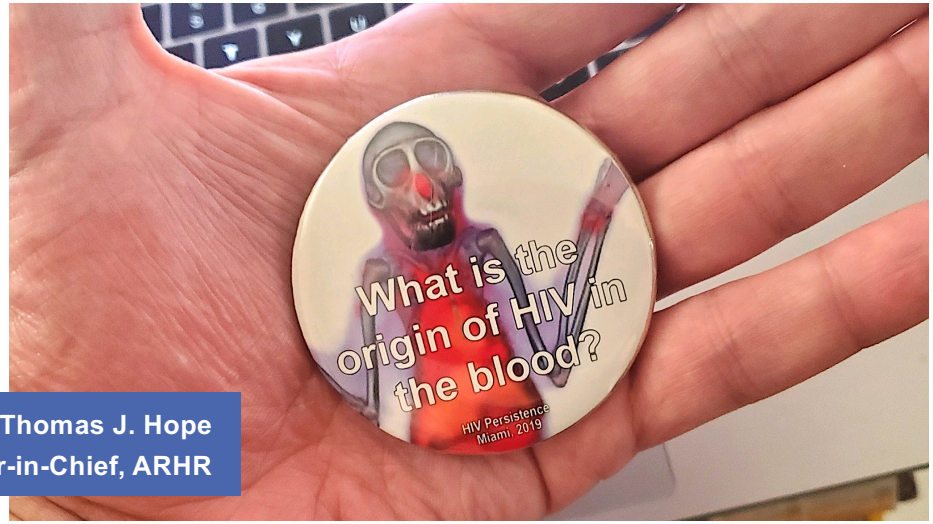
HOW TO PRESENT

Choose your clothes
to match your poster color



HOW TO PRESENT

Make a JPG of your poster (or research organism) and order yourself **a t-shirt** to wear at conference



Dr. **Thomas J. Hope**
Editor-in-Chief, ARHR

Buttons work, too. Hand them out at the hotel bar the night before the conference starts.

HOW TO PRESENT

If you're assigned to a dark corner in the poster session room, buy a cheap flashlight and stick it on a leash for visitors. Or, better, **attach a clip-on, battery-powered lamp.**

If you're unhappy with your assigned poster location, **go mobile**. Just convert your poster into something wearable then go find an audience.


FINAL
THOUGHTS
POSTER SESSIONS
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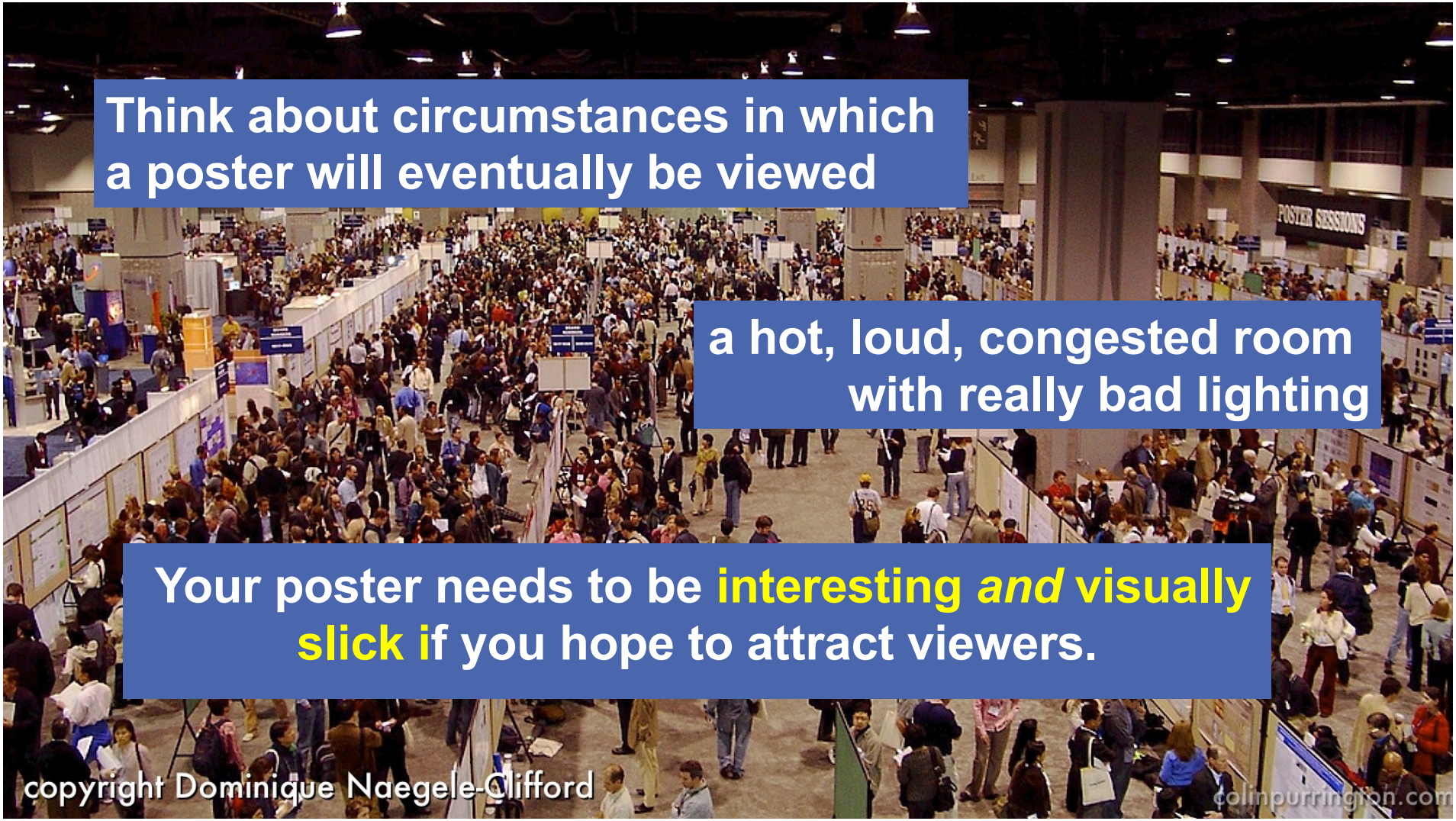
Think about circumstances in which a poster will eventually be viewed
a hot, loud, congested room with really bad lighting
Your poster needs to be interesting *and* visually slick if you hope to attract viewers.
POSTER SESSIONS
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DISCUSSION

Questions?
Comments?
Concerns?

Thank You

Open for Questions

Michael Louella mlouella@uw.edu

Feedback Survey

A link to the feedback survey has been sent to the email address you used to register.

Please get out your device, find that email, and spend a few moments completing that survey before you leave today.

Tip: If on a mobile device, shift view to landscape view (sideways) for better user experience.