09: **Presentations**

March 30, 2012

Announcements

- Poll (1.45pm)
  - A = 8
  - B = 7 (why?)
- Shall we split?

What schedule do you prefer for the end of the semester?

Option
Plan A (this is the current syllabus) - Fri Mar/30 class about presentations - Fri Apr/6 class about research admin/commercialization - Fri Apr/13 your presentations done!
Plan B - Fri Mar/30 class about presentations - Fri Apr/6 class about presentations (continued), and discussion of proposal reviews - Fri Apr/13 class about research admin/commercialization - Th/F Apr 19/20 (time tbd) your presentations [note this is during the exam period]
Total

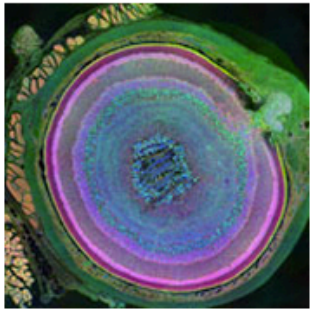
Back

NSF Science+Engineering visualization challenge

http://www.nsf.gov/news/special_reports/scivis/winners_2011.jsp

PHOTOGRAPHY

First Place



Metabolomic Eye
Credit: Bryan William Jones, Moran Eye Ce

This beautiful set of concentric rings and s
cells in the eye of a mouse. In all, 70 diffe
each colored a unique shade. Muscle cells,
whereas scleral tissue, surrounding the er

Honorable Mention

Microscopic Image of Trichomes on t
Credit: Robert Rock Belliveau

For this close-up, vibrant shot of a young
Unlike microscopes that use normal, unpo
light as it passes through small objects pr
at 800× magnification, are trichomes. Th
naked eye, like a thin film of fuzzy hair. Th
mouths of predators and their bulbous bas
cucurbitacins.

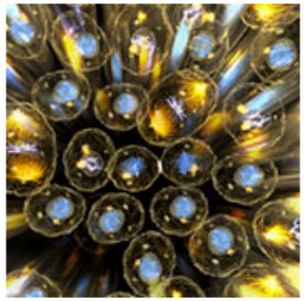
People's Choice

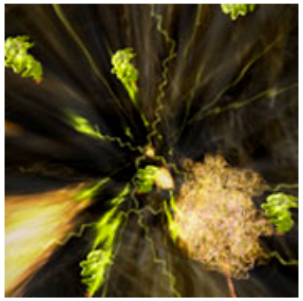
The Cliff of the Two-Dimensional Wo
Credit: Babak Anasori, Michael Naguib, Yu

This landscape, which looks like a red-rock
it's a nanostructured material made from
under an electron microscope. These exfo
University in Philadelphia dubbed MXenes,
each strip is only five atomic layers thick.
MXenes could be used in energy storage d
writes. And they could give the majesty o
competition.

ILLUSTRATIONS

Honorable Mention

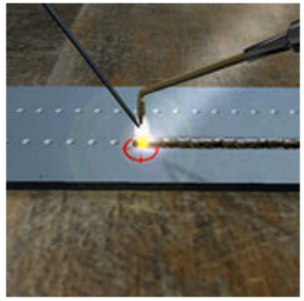


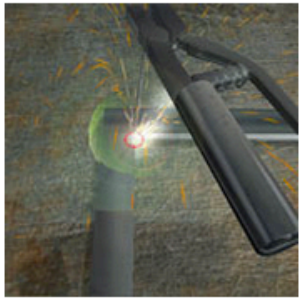


Powers of Minus Ten
Credit: Laura Lynn Gonzalez,

In Powers of Minus Ten, devel
Eye Visualization, players take
the human hand and into indi
based on the famous 1968 sh
from outer space, then deep i
past the skin on the hand and
chromosomes and proteins bu
can tap on these cellular struc
game is constantly evolving: F
the mitochondria and even zoom down to the atomic level, Gonzalez says. Play Powers of M

People's Choice



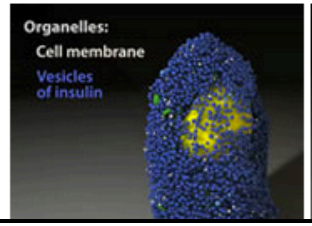


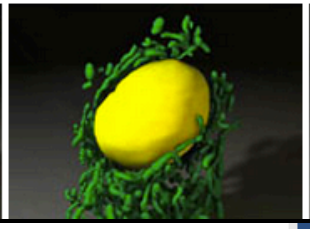
Velu the Welder
Credit: Muralitharan Vengadas
Palanimuthu, Fabian Herrera,
Services

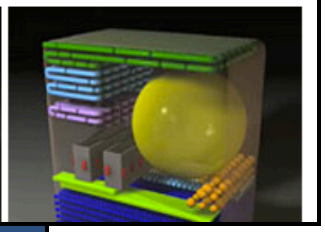
Learning to weld takes patien
challenge, the brainchild of de
Chennai, India, players step in
follow in the footsteps of Velu,
course in welding. First, Velu's
completing basic welding mov
they graduate to arc welding,
frame. The aim is to provide marketable skills to school dropouts in India.

VIDEOS (SCREEN SHOTS)

First Place and People's Choice







Science 30 March 2012:
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DOI: 10.1126/science.1215280

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Read Full Text to Comment (0)

REPORT

The Geometric Structure of the Brain Fiber Pathways

Van J. Wedeen[1,*], Douglas L. Rosene[2], Ruopeng Wang[1], Guangping Dai[1], Farzad Mortazavi[2], Patric Hagmann[3], Jon H. Kaas[4], Wen-Yih I. Tseng[5]

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Communication is key

"…to be effective communicators, scientists have to learn to **stand back from their own work and see it as strangers might do**. It is not a difficult trick: even journalists have learned it.

…

What is the most significant thing about your research?

…

Which is more likely to make people attend?

…

Humphry Davy and Michael Faraday were stars of the lecture halls. Many distinguished scientists — Richard Feynman, J. B. S. Haldane and Peter Medawar among them — knew how to hold a popular audience, and they weren't afraid to address their peers with the same vividness and economy. In fact, **their fame became inseparable from their gift for words.**"

WORLD VIEW *A personal take on events*

Of course scientists can communicate

Tim Radford *takes aim at the popular myth that researchers are hopeless at explaining their work to a general audience.*

There are several canards about scientists, but one is more pernicious simply because so many scientists themselves repeat it: scientists are not good communicators.

Once again, the allegation is to be the subject of discussions, this time at next month's annual meeting of the American Association for the Advancement of Science in Washington DC. It can be found on *Nature*'s website, heard in research councils, it is even occasionally propagated by the public-engagement community, and sometimes endorsed by journalists. In response, I can only say bosh, balderdash and Bronowski, and follow with other intemperate expletives such as Haldane, Hawking and Huxley, Eddington and E. O. Wilson, not to mention, as if in a state of terminal exasperation, Dawkins!

Between 1980 and 2005, I commissioned working scientists to write for *The Guardian* newspaper — from astronomers royal to impoverished doctoral students — and almost all of them delivered high-standard, well-focused newspaper prose and many of them went on to live by the pen. I also encountered distinguished scientists who had already become literary stars.

One was the astronomer Carl Sagan, who told me that his literary hero was Thomas Henry Huxley. Another was the industrial chemist, poet and writer Primo Levi, who when I tried to ask him about the Two Cultures debate — the apparent divide between the humanities and sciences — gently reminded me that Dante Alighieri (himself the subject of at least one paper in *Nature*), was a member of the Florentine guild of physicians and apothecaries. And a third was the Czech poet and dissident Miroslav Holub, who wrote his occasional *Guardian* column in English, and asked that at the end of each I describe him as the author of *Immunology of Niels Mor* (1989). All three were better writers than most writers: two will still be famous as writers a century from now.

They were, of course, exceptions. We all inherit the gift of words; the gift for words, however, is unevenly distributed. Even so, there are reasons why scientists, in particular, should be and often are good communicators. One is that most scientists start with the engaging quality of enthusiasm — to get through a degree course, the PhD and all the research-council hoops, you would need it — and enthusiasm is derived from a Greek term that means divinely intoxicated. Enthusiasm is infectious, but to command an audience of readers, scientists should exploit their other natural gifts. One of these is training in clarity. Another is training in observation. And a third is knowledge.

Those who can think clearly can usually write clearly: thoughts have value only when expressed, and the more clearly they are expressed, the greater their potential value. Those whose business is to observe are aware of subtle differences that must be described, or the observations would be meaningless. And those who write must have something new or useful to say: if not, why say anything? A novelist who does not publish is not a novelist. A scientist who does not publish remains a scientist — at least for the duration of the research-council grant — but the science performed is of no apparent value until somebody else hears about it.

The problems for the scientist as a public communicator start with academic publishing: the language, form and conventions of the published scientific paper could almost have been devised to conceal information. Even in conversation, scientists start with a communication problem — words that are perfectly ordinary within science are simply never heard on a football terrace or in a tavern or bus queue. So to be effective communicators, scientists have to learn to stand back from their own work and see it as strangers might do.

It is not a difficult trick: even journalists have learned it. What is the most significant thing about your research? Is it that, at cosmological distances, type Ia supernovae in high redshift galaxies seem insufficiently lustrous? Or is it that you have just realized that you cannot account for 71% of the Universe, make that 96% if you throw in dark matter alongside this newly discovered dark energy? Which is more likely to make people attend? Humphry Davy and Michael Faraday were stars of the lecture halls. Many distinguished scientists — Richard Feynman, J. B. S. Haldane and Peter Medawar among them — knew how to hold a popular audience, and they weren't afraid to address their peers with the same vividness and economy. In fact, their fame became inseparable from their gift for words. So the case for scientists as inherently bad communicators is a canard.

ENTHUSIASM IS **INFECTIOUS**, BUT TO COMMAND AN AUDIENCE OF READERS, SCIENTISTS SHOULD **EXPLOIT THEIR** OTHER NATURAL **GIFTS.**

And while we have our ducks in a row, let me invoke the canard that scientists occasionally propagate about the media: that it does not appreciate scientific uncertainty. That one is especially irritating. It seems to say "I, as a scientist, wish to have it both ways. I want the privilege of knowing better than you, and the indulgence of being wrong without guilt, because science, don't you see, is really about uncertainty." To which the foolish answer might be "In which case, why should we listen?" But alas, people in any case listen selectively, even to the best communicators, which might be why so many Americans think Darwin's theory of evolution is "only a theory". Scientists are not the only people to blame for a problem in communication. ■

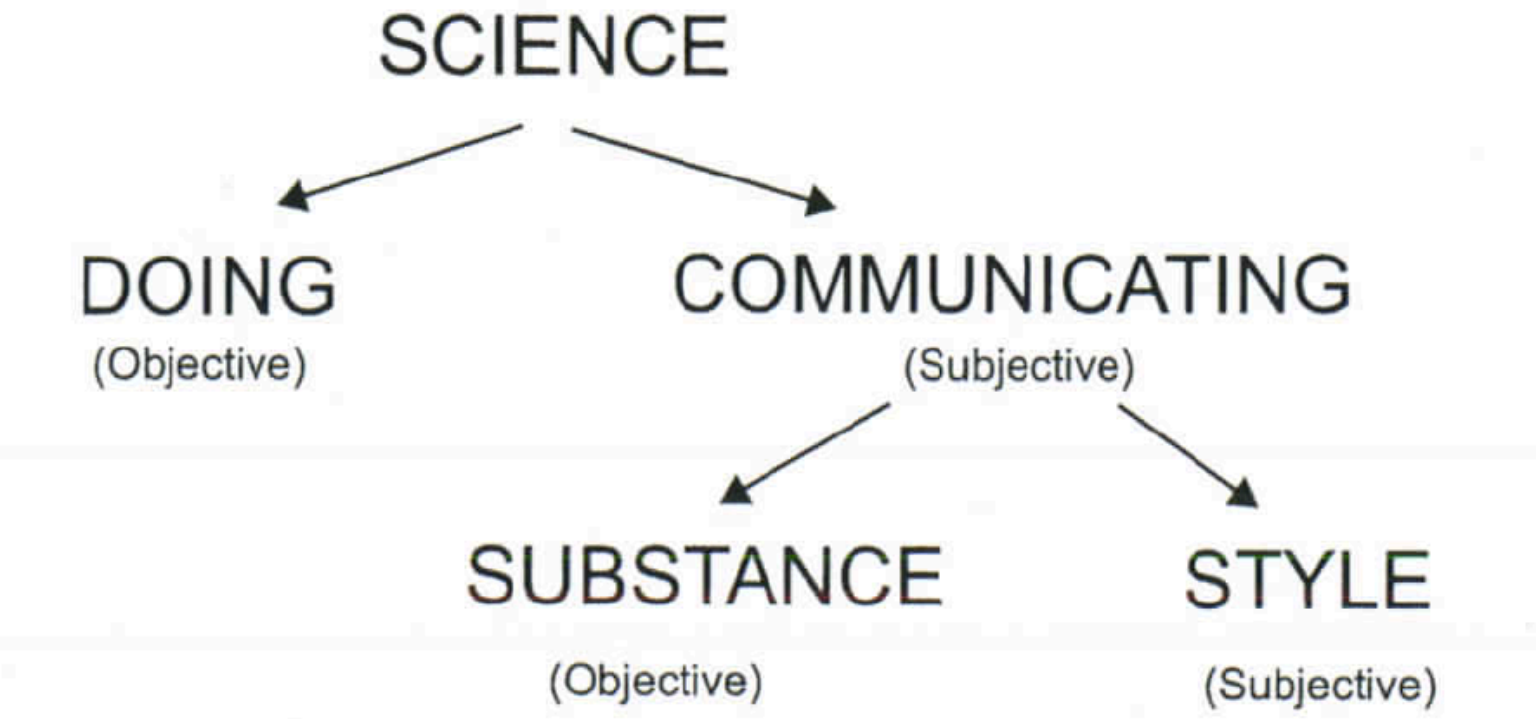
Tim Radford *was science editor of* The Guardian *until 2005.*
e-mail: tim.radford@guardian.co.uk

NATURE.COM
Discuss this article online at:
go.nature.com/nu3rpl

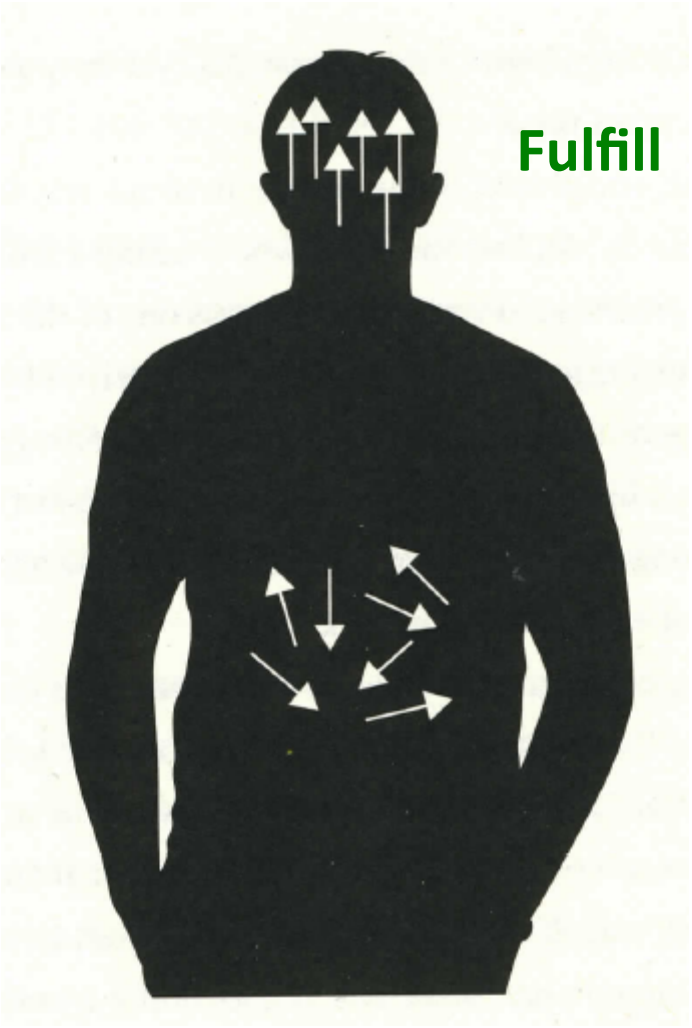
Radford, *Nature* 469:445, 2011

Today: presentations

- Planning the presentation
- Building the content (slides)
- Preparing the narrative and practicing
- Delivering the presentation



Randy Olson, Don't Be Such a Scientist



Fulfill

Arouse

Randy Olson, Don't Be Such a Scientist

References

ctools

- excerpts from Don't Be Such a Scientist, Randy Olson
- "Effective oral presentations", Jean-Luc Doumont
- interview with Alan Alda, "Communicating Science"

Other

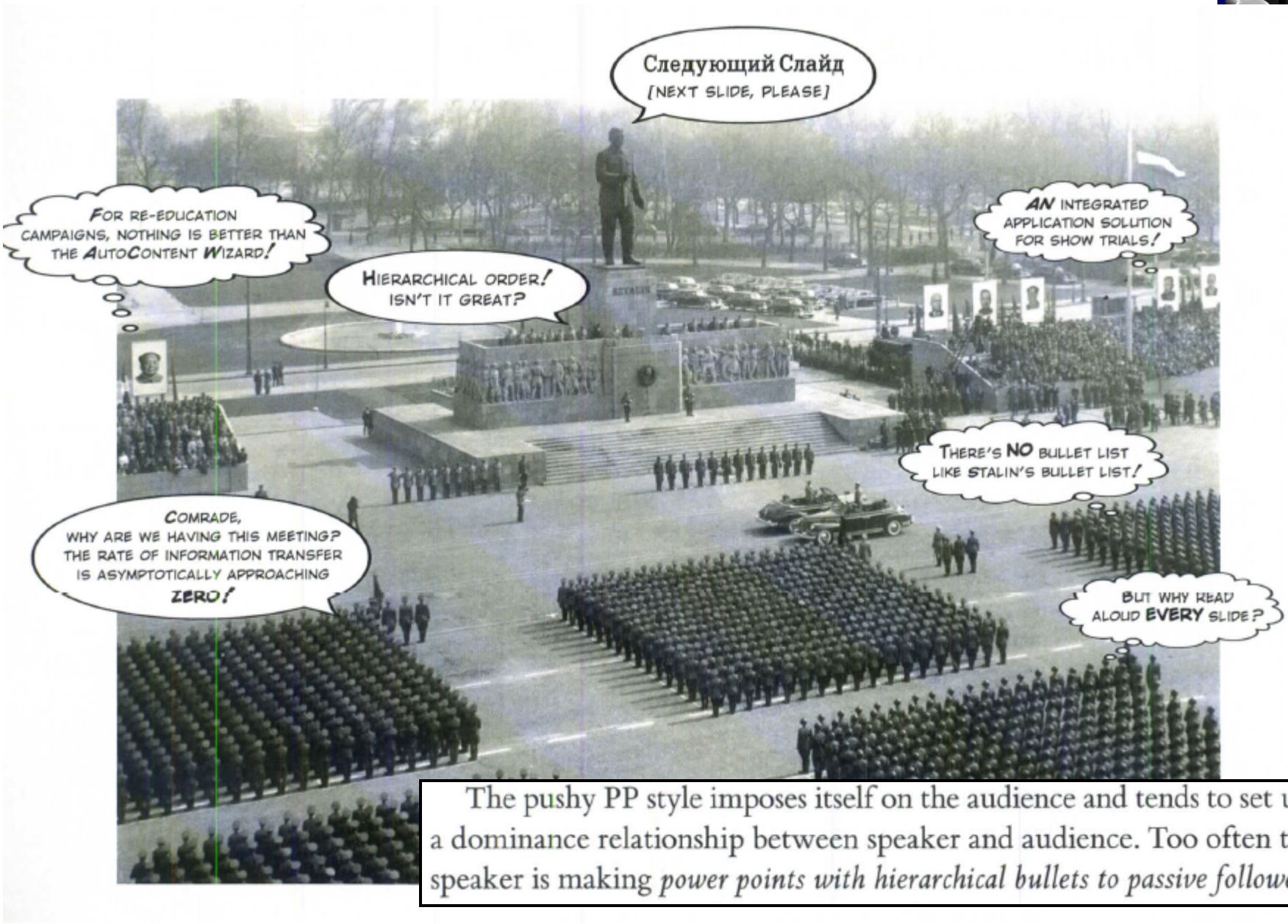
- "Seminar on giving seminars" by Prof. Ken Suslick (UIUC) http://www.scs.illinois.edu/suslick/seminars.html
- Edward Tufte, "The Cognitive Style of Powerpoint: Pitching out corrupts within"
- Nancy Duarte, "The secret structure of great talks" http://www.ted.com/talks/nancy_duarte_the_secret_structure_of_great_talks.html (on trajectories and storytelling)

(example RFE presentation)

Let's talk about

- Organization of the presentation
- Clarity of key ideas
- Clarity of details
- Slide design (text + graphics)
- Delivery (voice, style)

Tufte's opinion of Powerpoint



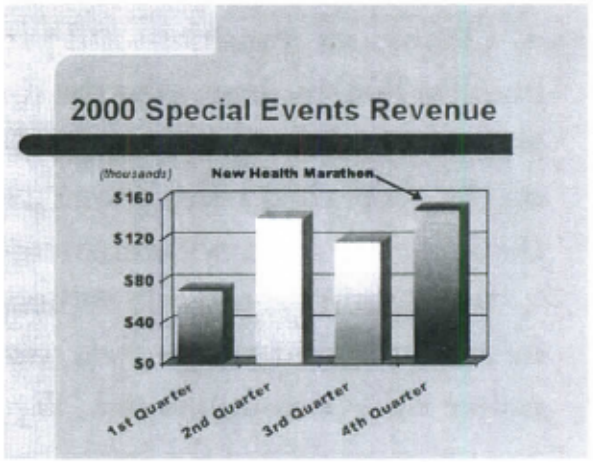
The pushy PP style imposes itself on the audience and tends to set up a dominance relationship between speaker and audience. Too often the speaker is making *power points with hierarchical bullets to passive followers.*

Edward Tufte, "The Cognitive Style of Powerpoint: Pitching out corrupts within"

Presentations tend to have graphics with low data density (why?)

MEDIAN NUMBER OF ENTRIES IN DATA MATRICES FOR STATISTICAL GRAPHICS IN VARIOUS PUBLICATIONS, 2003

Science	> 1,000
Nature	> 700
New York Times	120
Wall Street Journal	112
Frankfurter Allgemeine Zeitung	98
New England Journal of Medicine	53
Asahi	40
Financial Times	40
The Economist	32
Le Monde	28
→ 28 books on PowerPoint presentations (1997–2003)	12
Pravda (1982)	5



Pravda, May 24, 1982.

Edward Tufte, "The Cognitive Style of Powerpoint: Pitching out corrupts within"

The Gettysburg address

Four score and seven years ago our fathers brought forth on this continent a new nation, conceived in liberty, and dedicated to the proposition that all men are created equal.

Now we are engaged in a great civil war, testing whether that nation, or any nation, so conceived and so dedicated, can long endure. We are met on a great battle-field of that war. We have come to dedicate a portion of that field, as a final resting place for those who here gave their lives that that nation might live. It is altogether fitting and proper that we should do this.

But, in a larger sense, we can not dedicate, we can not consecrate, we can not hallow this ground. The brave men, living and dead, who struggled here, have consecrated it, far above our poor power to add or detract. The world will little note, nor long remember what we say here, but it can never forget what they did here. It is for us the living, rather, to be dedicated here to the unfinished work which they who fought here have thus far so nobly advanced. It is rather for us to be here dedicated to the great task remaining before us—that from these honored dead we take increased devotion to that cause for which they gave the last full measure of devotion—that we here highly resolve that these dead shall not have died in vain—that this nation, under God, shall have a new birth of freedom—and that government of the people, by the people, for the people, shall not perish from the earth.

Abraham Lincoln, November 19, 1863

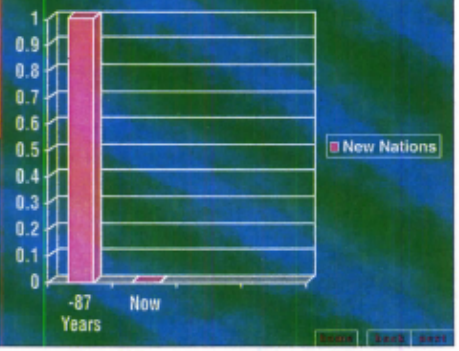
t = 2 minutes

Gettysburg Cemetery Dedication

Abraham Lincoln

11/19/1863

Organizational Overview



11/19/1863

Agenda

- Met on battlefield (great)
- Dedicate portion of field - fitting!
- Unfinished work (great tasks)

11/19/1863

Review of Key Objectives & Critical Success Factors

- What makes nation unique
  - Conceived in Liberty
  - Men are equal
- Shared vision
  - New birth of freedom
  - Gov't of/for/by the people

11/19/1863

Not on Agenda!

- Dedicate
- Consecrate
- Hallow
  (in narrow sense)
- Add or detract
- Note or remember what we say

11/19/1863

Summary

- New nation
- Civil War
- Dedicate field
- Dedicated to unfinished work
- New birth of freedom
- Government not perish

11/19/1863

A BETTER metaphor for presentations is *good teaching*. Practical teaching techniques are very useful for presentations in general. Teachers seek to explain something with credibility, which is what many presentations are trying to do. The core ideas of teaching—*explanation, reasoning, finding things out, questioning, content, evidence, credible authority not patronizing authoritarianism*—are contrary to the cognitive style of PowerPoint. And the ethical values of teachers differ from those engaged in marketing.[7]

Edward Tufte, "The Cognitive Style of Powerpoint: Pitching out corrupts within"

Powerpoint is our framework; there is rarely an alternative.

Nevertheless, we should design the presentation to fit the message, rather make the message fit the presentation.

We must organize our thoughts before touching powerpoint!

How to begin: know your audience

- Who are they? How many?
- What do they know? (background/field)
- Why are they attending?
- What do they want to learn about?

and define the boundary conditions

- How much time? (how many slides?)
- What is the room like? (check it out in advance if possible)

Table 5-1. How the Broad versus Academic Audiences Respond to Various Aspects of Communication

	Broad	Academic
Main information channel	Visual	Audio and visual
Structure	Need a story	Information is fine
Mode of response	Visceral	Cerebral
Need humor?	Pretty much	Not necessarily
Like sincerity?	Always	Suspicious of it
Sex appeal?	The ultimate	Potential disaster
Prearoused?	No	Yes
Effective elements	Humor, sincerity, sex	Information
Effective organs	Heart, gut, gonads	Head
Preferred voice	Human	Robotic

Randy Olson, Don't Be Such a Scientist

3 types of academic talks

- Seminar
  - Broad technical audience (specialists and generalists; experts and novices)
  - Audience needs to be motivated!
  - Typically 40-50 minutes
  - A few (2-3) major points
- Conference talk
  - Highly specialized audience (experts)
  - Audience *already* motivated
  - Typically 10-20 minutes
  - ONE major point
- Group meeting “update” (not of seminar or conference flavor)
  - Specialized audience
  - Maybe 10 minutes?
  - Focus on a key finding or question (this should be really clear up front)

Define the message and scope

"Imagine yourself standing outside the meeting hall after your presentation, asking audience members what they got out of your talk:

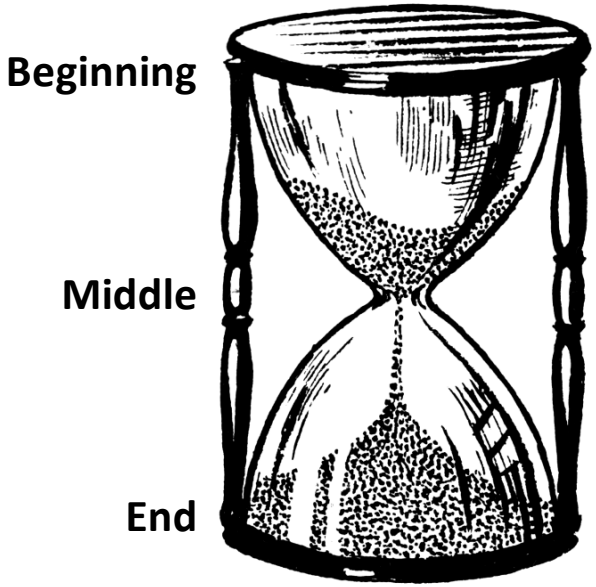
- What did you learn?
- What do you now understand that you didn't before?
- What action will you take because you heard my presentation?"

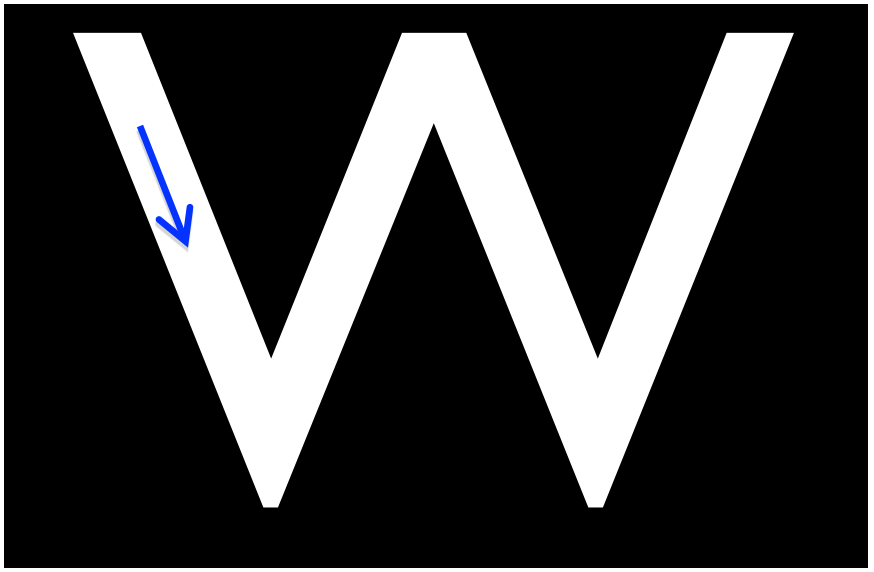
Hamlin, How to talk so people listen

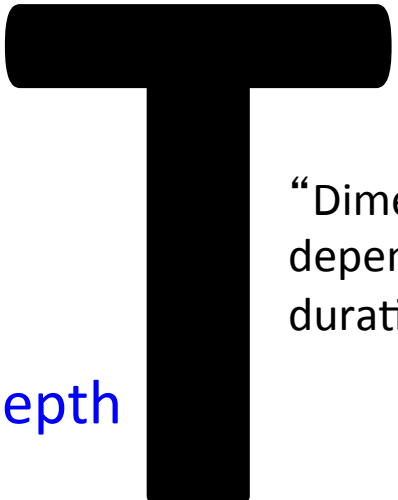
TEACH

The trajectory

- Start broad, end broad. Details in the middle. Make smooth transitions between key points.







Always need both breadth and depth!

"Dimensions" of the **T** depend on audience and duration of talk

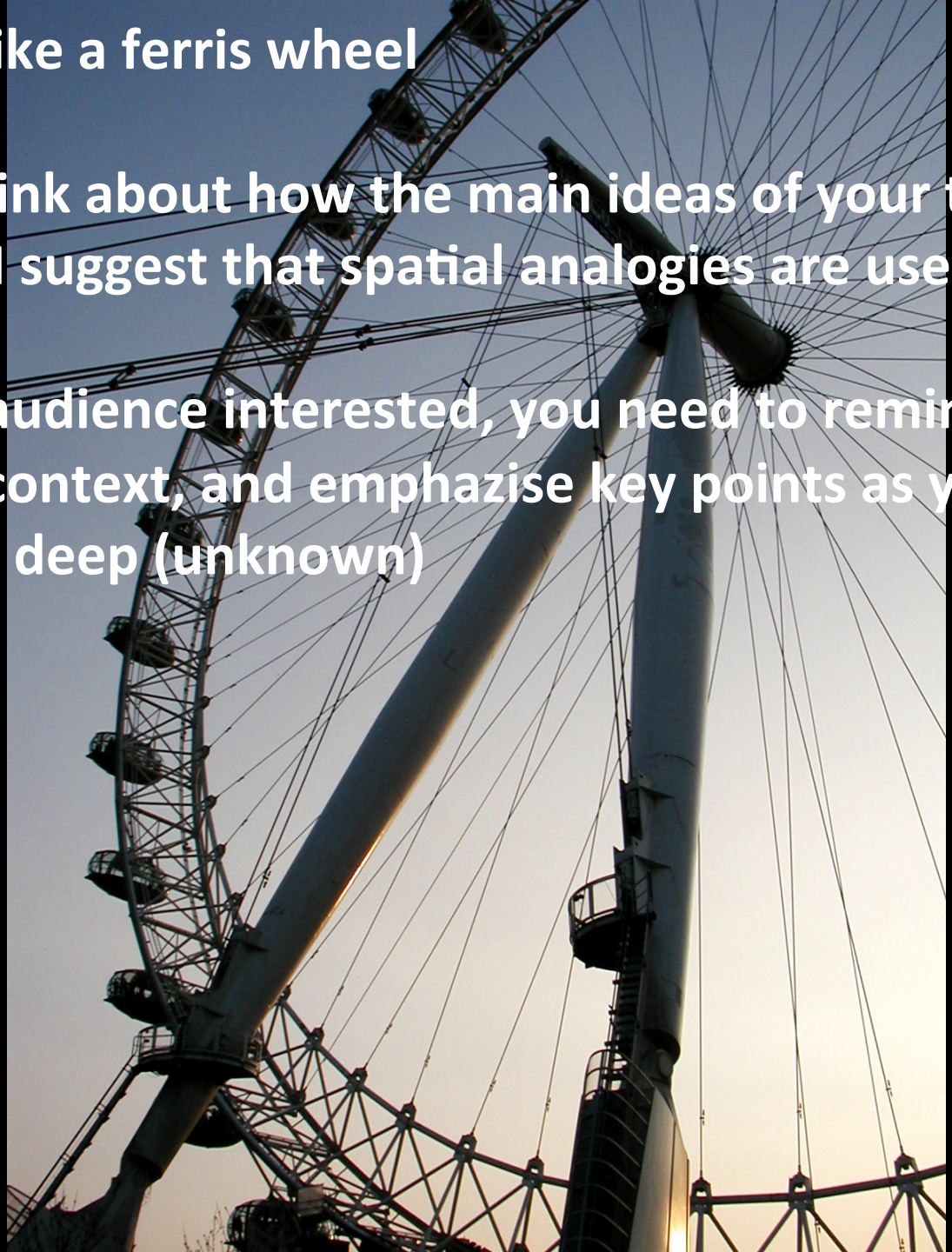
Nancy Duarte, “The secret structure of great talks”

http://www.ted.com/talks/nancy_duarte_the_secret_structure_of_great_talks.html
450,000 views in <2 months

Or maybe a like a ferris wheel

The point: think about how the main ideas of your talk are related, and I suggest that spatial analogies are useful

To keep the audience interested, you need to remind them of the context, and emphazise key points as you dive back into the deep (unknown)



The London Eye

In general, envision the framework

Attention getter
Need
Task
Main message
Preview (Object)

Arouse! Make a forceful and clear first impression

If it's a short presentation, consider a 1 slide summary (elevator pitch), right after the title slide …this really helps in an exam

Don't list the sections of your talk; preview the topics you will present

Point 1
transition
Point 2
transition
⋮

Make sure the main points follow a logical sequence, and their relationship is clear

Review
Conclusion
Close

Use the main points (findings) to build a perspective

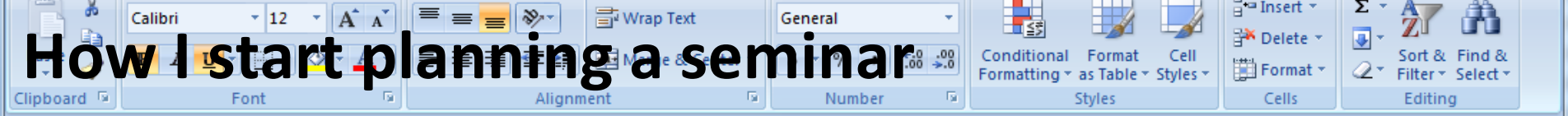
Emphasize the take-home messages

End forcefully (audience should feel very fulfilled)

How to build the presentation

1. Answer the scope questions
2. Make an outline (see spreadsheet example)
3. Start making the presentation
   a. Create a series of blank slides with placeholder titles
   b. Add images and important notes to slides
4. Revisit your desired scope; refine the structure and outline
5. Do the detailed slide-making
6. Practice…

How I start planning a seminar



#	Section	Slide topic	Notes / to do / things to say
1	title	title w/flowers	Carbon Nanotube Micromaterial Architectures
2	intro	muse	
3		nanocarbons	
4		elec/mech comparison	is there a good way to join electrical and mechanical properties? remove current progress and reveal later?
5		application map -general or MEMS?	difficult to make great combinations of properties
6		guy with bag?	
7			
8	growth	cvd diagram	focus on process control for efficient synthesis
9		helveg video or stach?	what's important: gas and catalyst ...express the challenges succinctly
10		forest growth schematic w/AFM	
11		hot wall and cold wall systems	
12		tall forest on sabre	
13		forest growth video	
14		sidewall and diameters	
15		kinetics with alkynes	note abrupt termination and savings in emissions using the correct carbon sources
16		collective model	density of nucleation, rate of growth, and rate of decay depend strongly on fluctuations we don't understand
17		distributions	height and density versus time in calendar
18		robofurnace - photo w/arrows	
19		robofurnace - video	forest coming out of the oven!
20	capillary forming	grid pattern, with obamas inset	
21		sidewall image	
22		elastofibers AND futaba and chakarpani	
23		CF process diagram	
24		CF beaker [and DC w/flux curve]?	
25		wells before and after	
26		wells ESEM video	
27		well map	
28		semicircles (PrE intro)	
29		tilting model (new details from PrE)	
30		trusses and flowers	
31		twists	
32		motivation: wang tilting and wegener helices	geometry AND properties matter!
33		rings and conductivity data?	
34		mech pillars w/comparison chart	*where do the rings come in?
35	replication	replication diagram with 1 pillar	
36		replication 5 cycles	
37		replication AFM	
38		replication HEX and TWIST	

A better seminar

- Tweaked the content based on the audience and their interests
- Clear transitions, and “W” emphasis
- Fewer slides (60 → 45)
- Fewer, more important visual elements on slides

In any case, no mysteries!

Principles of good slide design

Layout:

- Don’t use bright background colors or wacky templates; black-and-white are typically best, with careful use of color for emphasis
- Make sure the visual elements are in a logical order (i.e., the eye reads from top-bottom and left-right), and are aligned
- Make sure the audience can read all labels/axes
- Avoid imbalanced empty space and one-word lines (orphans)
- Don’t have >2 bullet levels

- GOOD
  - OK
    - Noooo……

Principles of good slide design

Content:

- Use concise and descriptive titles (“so what”, not just “what”)
- Don’t have too much text
  - You aren’t supposed to read the slide; rather, the slide is a visual to accompany your spoken words.

- Make sure every element is there for a reason

→ *Simple* designs are best – have a high **data-ink ratio**!

Use photos to illustrate an important observation

The rapidly accelerating Columbia in effect ran into the foam debris. Post-accident frame-by-frame analysis yields the impact velocity of the foam, 600 miles or 970 km per hour, the speed of sound. Since kinetic energy = $\frac{1}{2}mv^2$, the velocity-squared contribution is substantial.

In the video, 2 relevant variables are indeterminate: impact *angle of incidence* and impact *location*. Did the debris hit the insulation tiles on the left wing, or the reinforced carbon-carbon (RCC) on the leading edge of the wing? Post-accident investigation established that the foam hit the especially vulnerable RCC.

The Boeing study (during shuttle flight) used (bad) slides in lieu of written reports!

On this one Columbia slide, a PowerPoint festival of bureaucratic hyper-rationalism, 6 different levels of hierarchy are used to display, classify, and arrange 11 phrases:

Level 1	Title of Slide
Level 2	● Very Big Bullet
Level 3	– big dash
Level 4	◆ medium-small diamond
Level 5	• tiny bullet
Level 6	( ) parentheses ending level 5

The analysis begins with the dreaded Executive Summary, with a conclusion presented as a headline: "Test Data Indicates Conservatism for Tile Penetration." This turns out to be unmerited reassurance. Executives, at least those who don't want to get fooled, had better read far beyond the title.

The "conservatism" concerns the *choice of models* used to predict damage. But why, after 112 flights, are foam-debris models being calibrated during a crisis? How can "conservatism" be inferred from a loose comparison of a spreadsheet model and some thin data? Divergent evidence means divergent evidence, not inferential security. Claims of analytic "conservatism" should be viewed with skepticism by presentation consumers. Such claims are often a rhetorical tactic that substitutes verbal fudge factors for quantitative assessments.

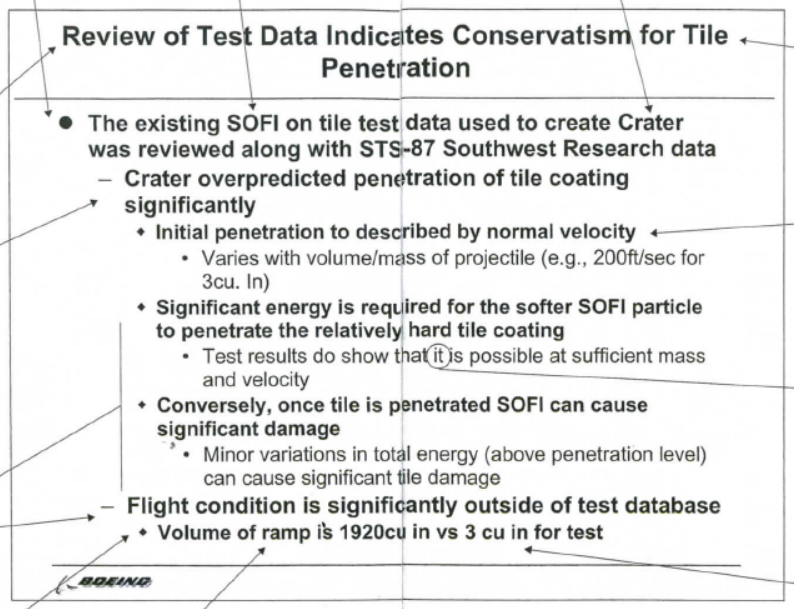
As the bullet points march on, the seemingly reassuring headline fades away. Lower-level bullets at the end of the slide undermine the executive summary. This third-level point notes that "Flight condition [that is, the debris hit on the Columbia] is significantly outside of test database." How far outside? The final bullet will tell us.

This fourth-level bullet concluding the slide reports that the debris hitting the Columbia is estimated to be 1920/3 = 640 times larger than data used in the tests of the model! The correct headline should be "Review of Test Data Indicates Irrelevance of Two Models." This is a powerful conclusion, indicating that pre-launch safety standards no longer hold. The original optimistic headline has been eviscerated by the lower-level bullets. Note how close attentive readings can help consumers of presentations evaluate the presenter's reasoning and credibility.

The Very-Big-Bullet phrase fragment does not seem to make sense. No other VBB's appear in the rest of the slide, so this VBB is not necessary.

Spray On Foam Insulation, a fragment of which caused the hole in the wing

A model to estimate damage to the tiles protecting flat surfaces of the wing



Here "ramp" refers to foam debris (from the bipod ramp) that hit Columbia. Instead of the cryptic "Volume of ramp," say "estimated volume of foam debris that hit the wing." Such clarifying phrases, which may help upper level executives understand what is going on, are too long to fit on low-resolution bullet outline formats. PP demands a shorthand of acronyms, phrase fragments, clipped jargon, and vague pronoun references in order to get at least some information into the tight format.

*The Columbia Accident Investigation Board (final report, p. 191) referred to this point about units of measurement: "While such inconsistencies might seem minor, in highly technical fields like aerospace engineering a misplaced decimal point or mistaken unit of measurement can easily engender inconsistencies and inaccuracies." The phrase "mistaken unit of measurement" is an unkind veiled reference to a government agency that had crashed $250 million of spacecraft into Mars because of a mix-up between metric and non-metric units of measurement.

The vigorous, vaguely quantitative, words "significant" and "significantly" are used 5 times on this slide, with meanings ranging from "detectable in a perhaps irrelevant calibration case study" to "an amount of damage so that everyone dies" to "a difference of 640-fold." None of the 5 "significants" refer to "statistical significance;" such wordplay hints that a formal statistical analysis has been done.

Note the analysis is about *tile* penetration. But what about RCC penetration? As investigators later demonstrated, the foam did not hit the tiles on the wing surface, but instead the delicate reinforced-carbon-carbon (RCC) protecting the wing leading edge. Alert consumers should carefully watch how presenters delineate *the scope of their analysis*, a profound and sometimes decisive matter.

?

Slideville's low resolution and large type generate space-wasting typographic orphans, lonely words dangling on 4 separate lines:

Penetration **significantly** 3cu. In and velocity

The really vague pronoun reference "it" refers to *damage to the left wing*, which ultimately destroyed the Columbia (although the slide here deals with tile not RCC damage). Low-resolution presentation formats encourage vague references because there isn't enough space for specific and precise phrases.

The same unit of measurement for volume (cubic inches) is shown in a slightly different way every time

3cu. In **1920cu in** **3 cu in**

rather than in clear and tidy exponential form 1920 in^3. Shakiness in conventions for units of measurement should always provoke concern, as it does in grading the problem sets of sophomore engineering students.* PowerPoint is not good at math and science; here at NASA, engineers are using a presentation tool that apparently makes it difficult to write scientific notation. The pitch-style typography of PP is hopeless for science and engineering, yet this important analysis relied on PP. Technical articles are not published in PP; why then should PP be used for serious technical analysis, such as diagnosing the threat to Columbia?

Comments on this slide?

The Problem

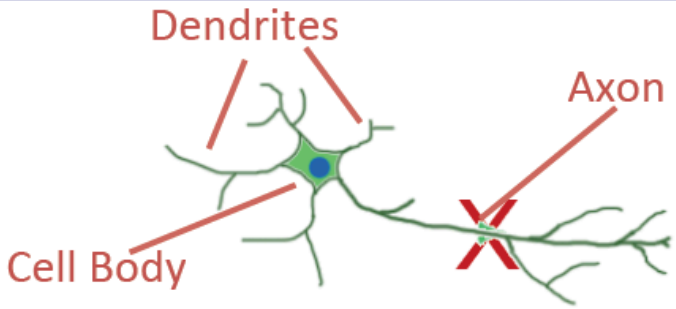
- None of the processes are 100% efficient.
- Thus, all these processes produce heat.
- The heat signature of reactions in a cell are in order of picowatts.

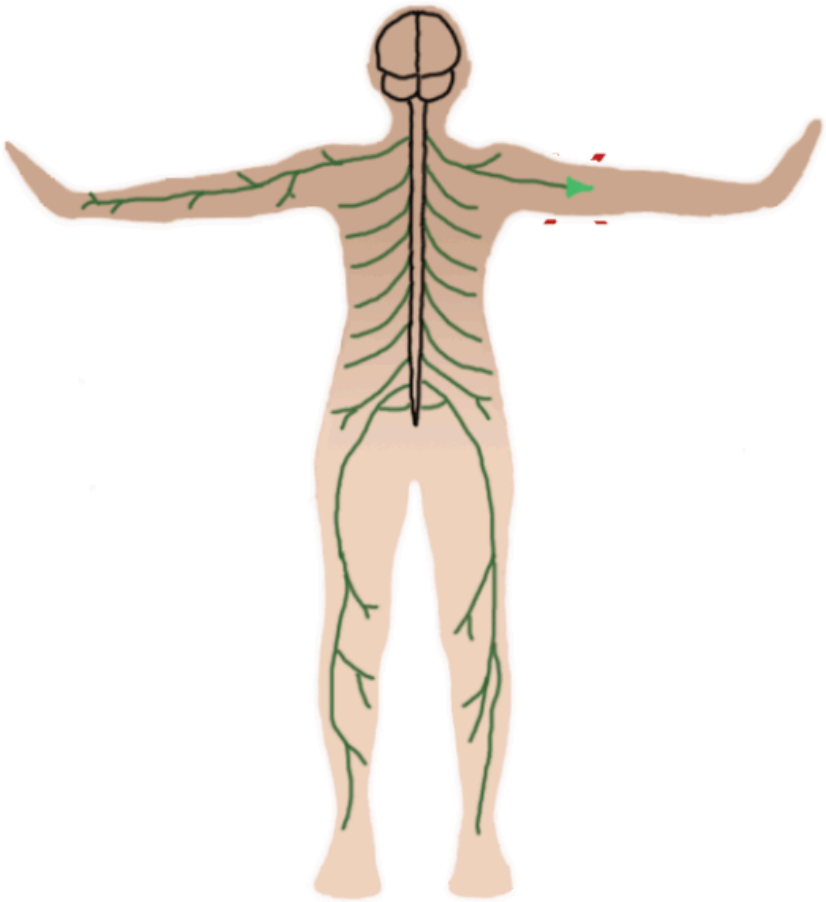
Cell Type	Avg. Approximated Heat Output
E. Coli	5 pW
T- Lymphoma	6.1 pW
Human Lung Fibroblast	20-48 pW
Human Skin Fibroblast	51 pW
Rat Hepatocyte	320 pW

- No calorimeter has been built to support this.
- For this reason, we cannot trace many metabolic activities of single cells (others are still possible).
- ATP turnover can only be discussed for ensemble of cells.
- Once our device is built, we can trace the activity of cells, label-free and without perturbing them, given that we have enough temporal resolution.
- A first goal is to make a heat output measurement from a single cell.

Peripheral Nervous System Repair

- Neuron Morphology
- Peripheral Nervous System vs Central Nervous System
- Peripheral Nervous System
  - 3 types of neurons
    - Autoneurons
    - Sensory Neurons
    - Motor Neurons
  - Ability to regenerate
    - 1 mm/day, away from spine
    - Limited length
    - Errors
  - Nerve Grafts

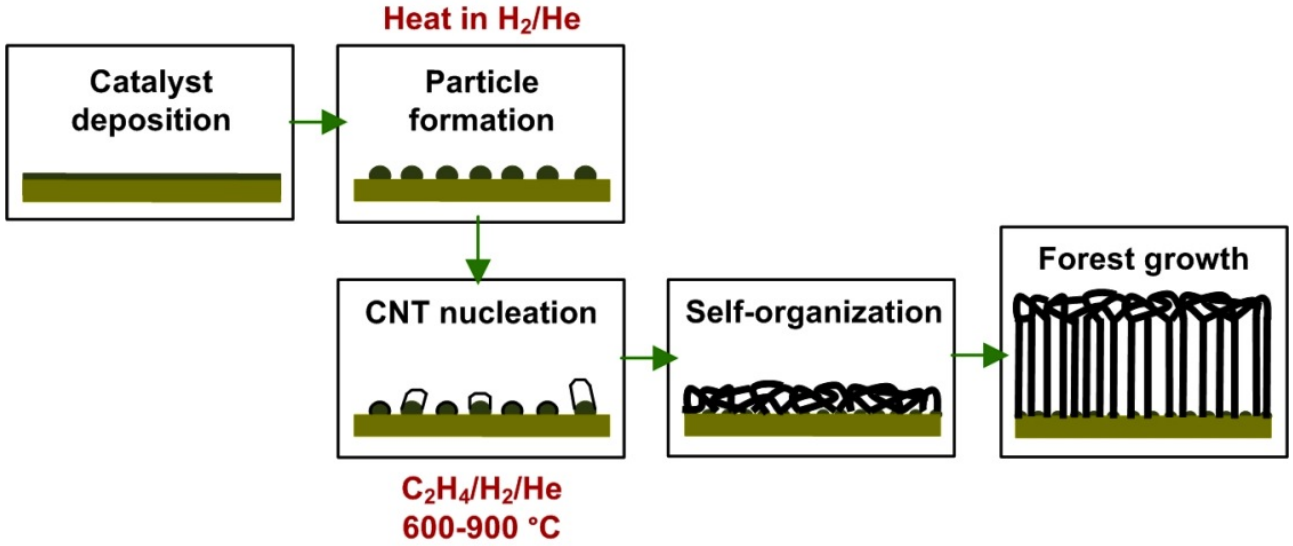




This slide has redundant information

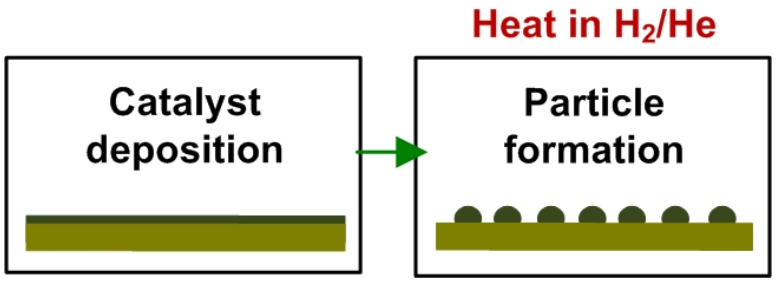
How to grow a CNT forest

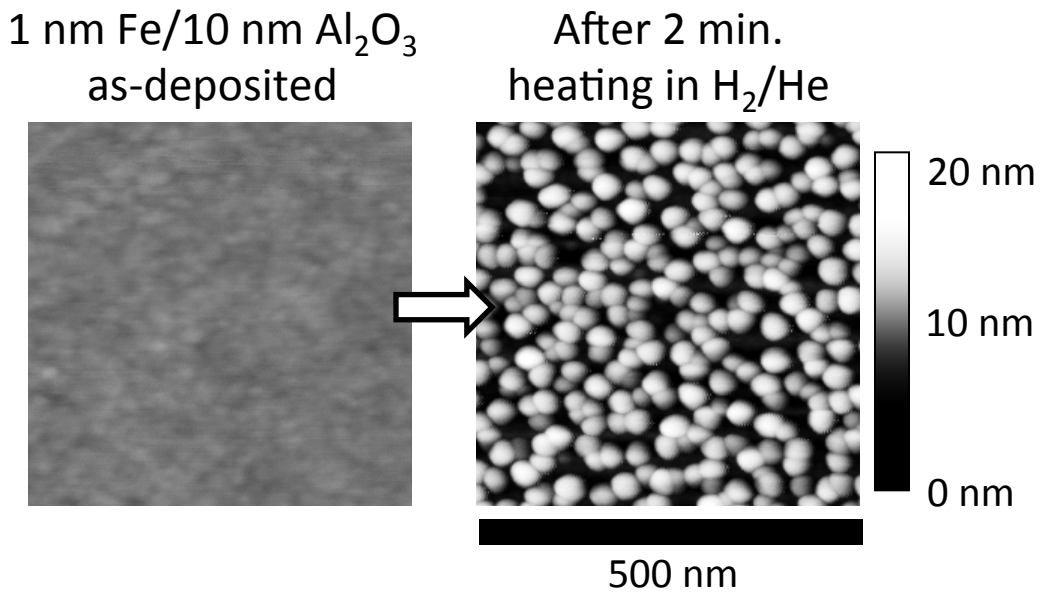
1. Deposit catalyst film on Si wafer by e-beam evaporation
2. Heat in 100/400 sccm H_2/He, 750 C
3. Add 100 sccm C_2H_4
4. Hold at 750 C for 1-30 minutes
5. Cool



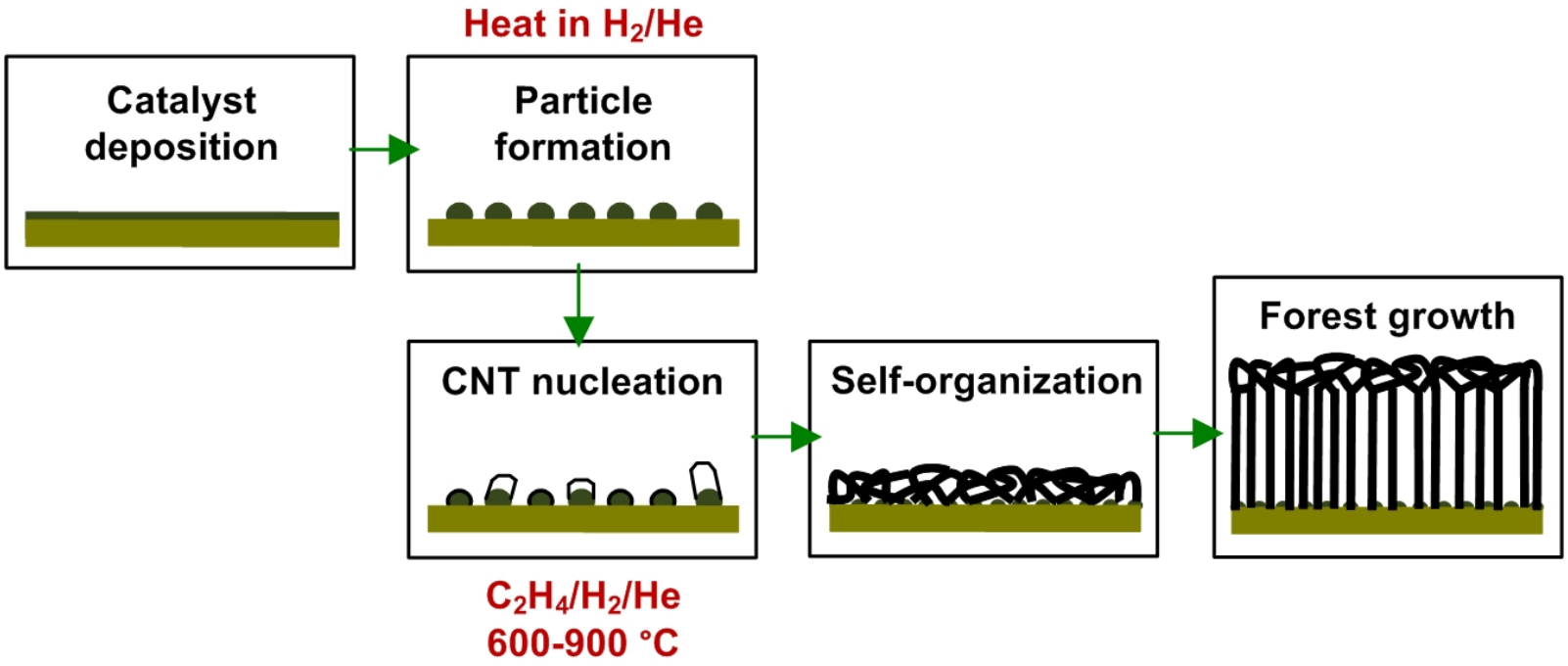
Hart and Slocum, *J. Phys. Chem. B* 110:8250-7, 2006.
Meshot, et al. *ACS Nano* 3(9):2477-2486, 2009.

Remove the text listing the steps: use figures and spoken words only, and show more results



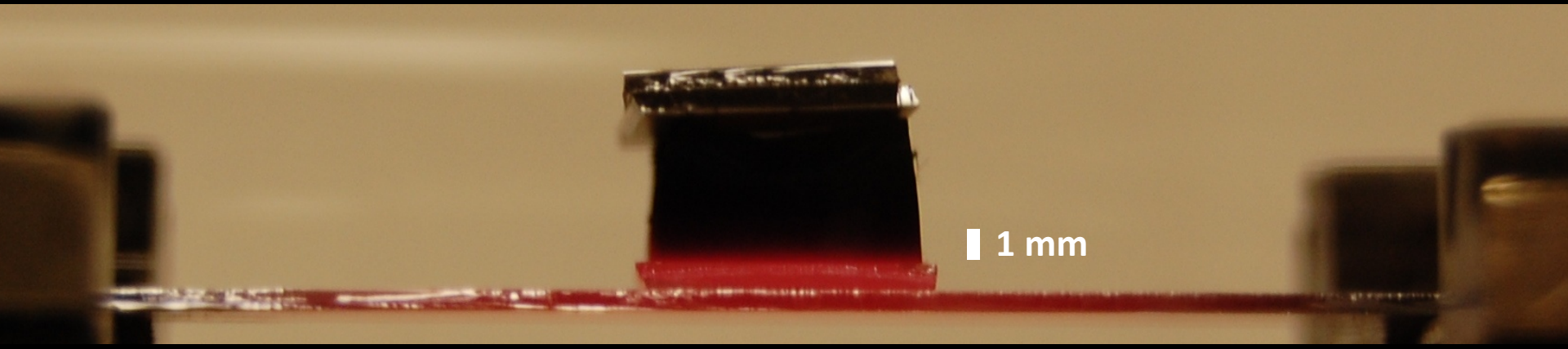


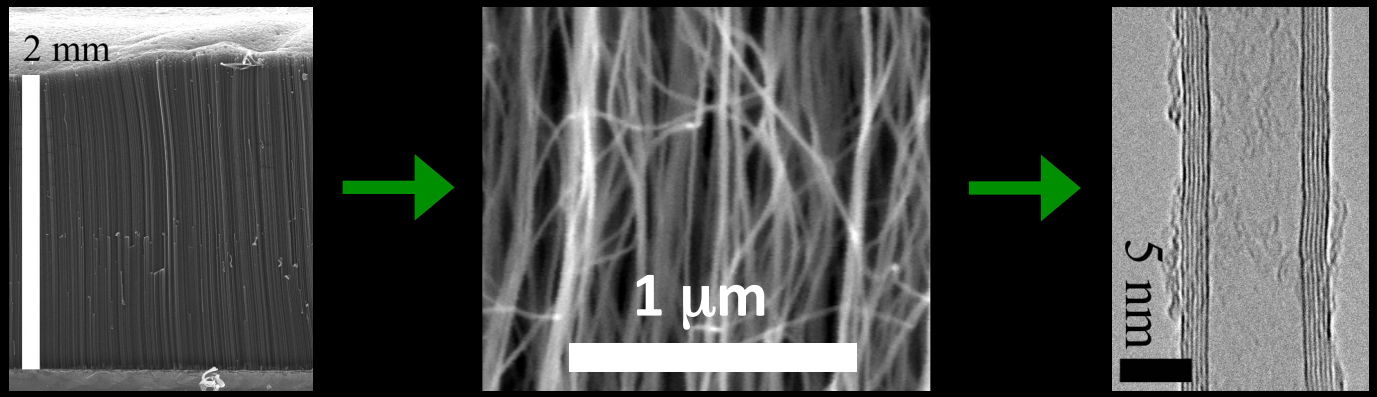
Hart and Slocum, *J. Phys. Chem. B* 110:8250-7, 2006.
Meshot, et al. *ACS Nano* 3(9):2477-2486, 2009.



Hart and Slocum, *J. Phys. Chem. B* 110:8250-7, 2006.
Meshot, et al. *ACS Nano* 3(9):2477-2486, 2009.

Tall CNT "forests"





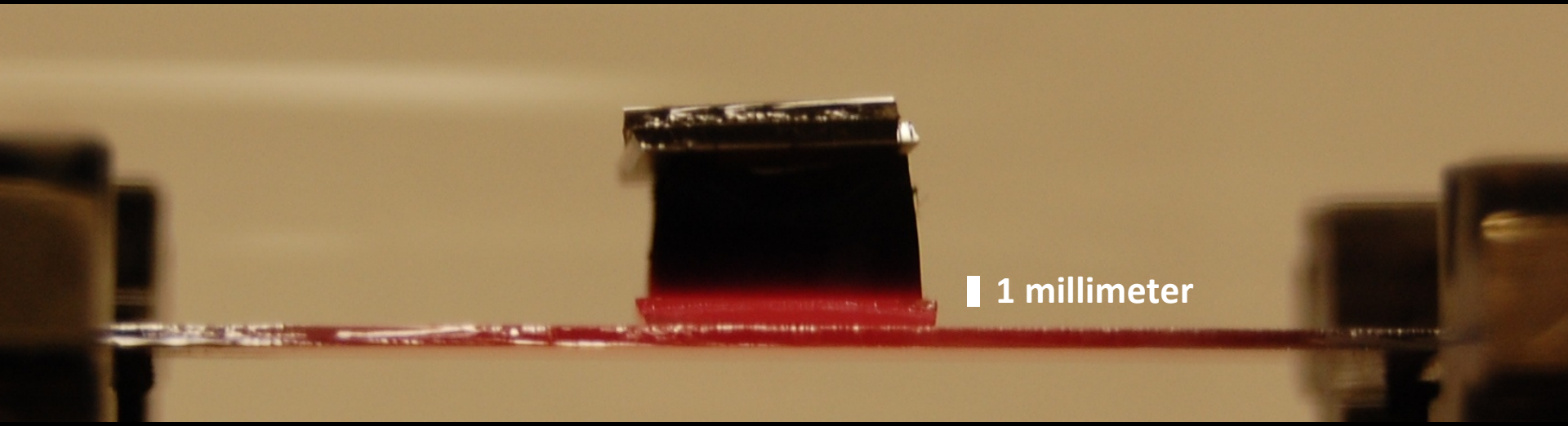
50X 70,000X 3,500,000X

- growth rate up to 500 microns/min: **a 1 ft diameter tree growing at 500 mph!**
- areal density: ~10^{10}- 10^{12} CNTs/cm^2
-volume fraction: ~ 1-5%

Hart and Slocum, *J. Phys. Chem. B* 110:8250-7, 2006.
Hart, van Laake, Slocum, *Small* 3(5):772-777, 2007.

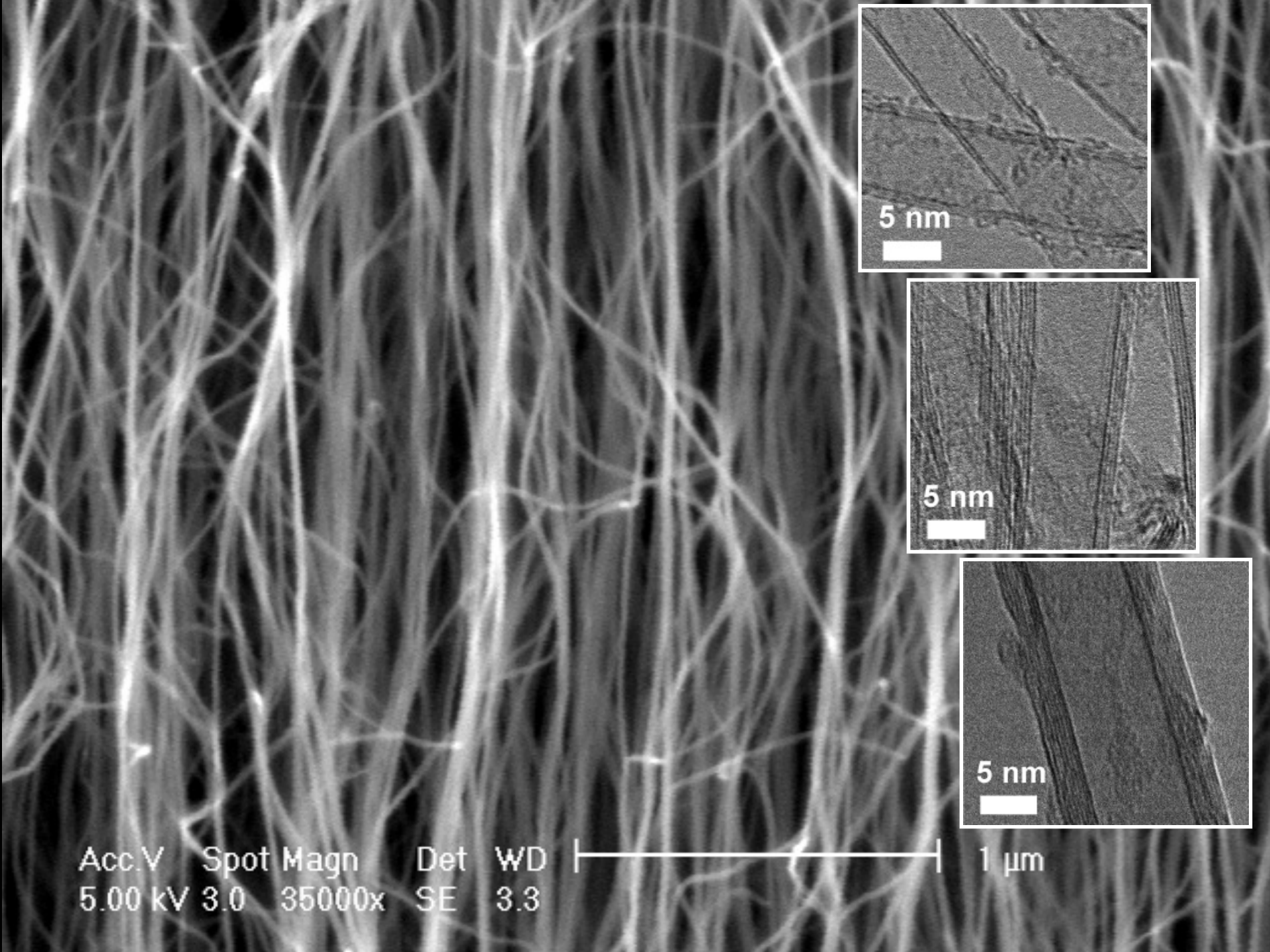
2 slides are better than 1?

a tall carbon nanotube forest



≈20 billion CNTs
≈99% air

Meshot, Plata, Tawfick, Zhang, Verploegen, Hart. *ACS Nano* 3(9):2477-2486, 2009.
Hart and Slocum, *J. Phys. Chem. B* 110:8250-7, 2006.
Hart, van Laake, Slocum, *Small* 3(5):772-777, 2007.


5 nm
5 nm
5 nm
Acc.V Spot Magn Det WD
5.00 kV 3.0 35000x SE 3.3
1 µm

The narrative

- Come up with 1-2 sentences to accompany each slide
- This should:
  - Transition from the previous slide
  - State the key point of the current slide (i.e., if you're in a rush this is all you need to say)

- In my opinion, its not necessary to memorize more than this
- Writing these sentences (essentially a script) will be very helpful to prepare, and will help refine the order of your presentation because you will realize how the ideas flow

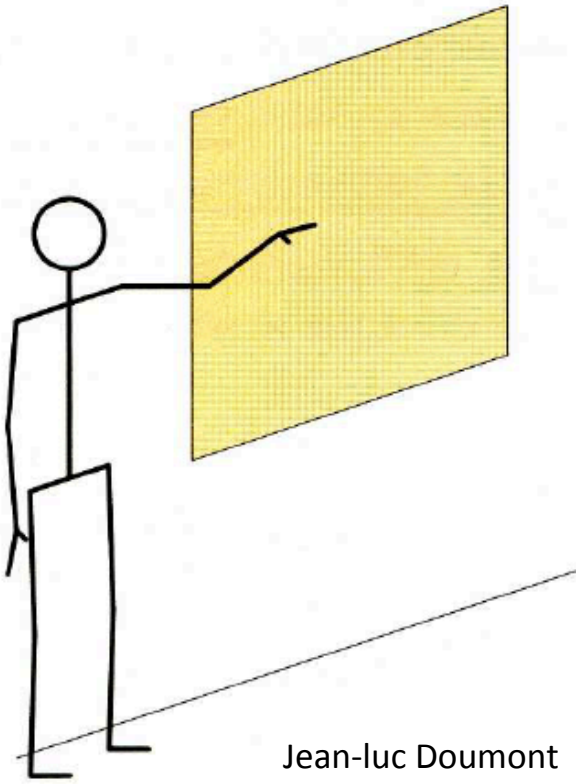
During the presentation

- Eliminate filler words (e.g., umm, err, essentially) and phrases
- Make eye contact (don't look at the screen or laptop!)
- Modulate your tone of voice, rate, and volume
- Keep the laser pointer under control

The face conveys emotions. The eyes look at the audience (at everyone, at all times).

The hands make deliberate, varied, highly visible gestures and no noise between gestures.

The body assumes a confident, stable stance. Shoulders, hips, and feet are facing the audience.



Jean-luc Doumont

A presentation is a live performance

Effect of colour coordination of attire with poster presentation on poster popularity

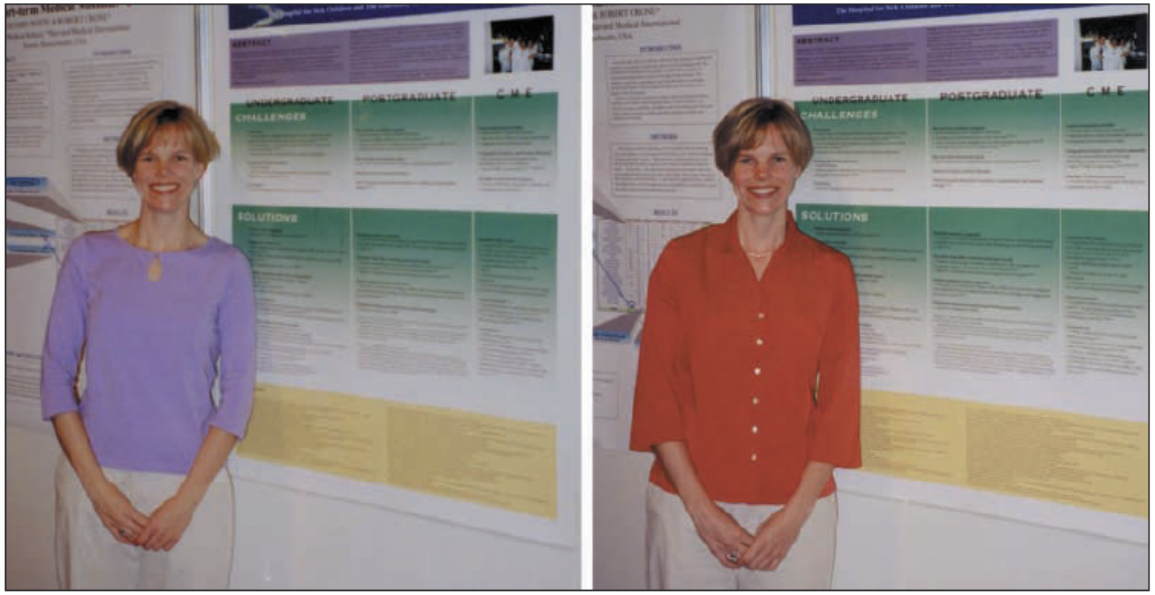


Fig. 1: Study presenter in lavender-coloured blouse (chosen to coordinate with poster colour) and in rust-coloured blouse (chosen to clash with poster).

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

Table 1: Total number of visitors during poster session, by attire of study presenter

	No. of visitors		
Attire of study presenter	Study poster	Control poster	Total
Coordinated (lavender-coloured blouse)	68	40	108
Clashing (rust-coloured blouse)	32	71	103
Total	100	111	211

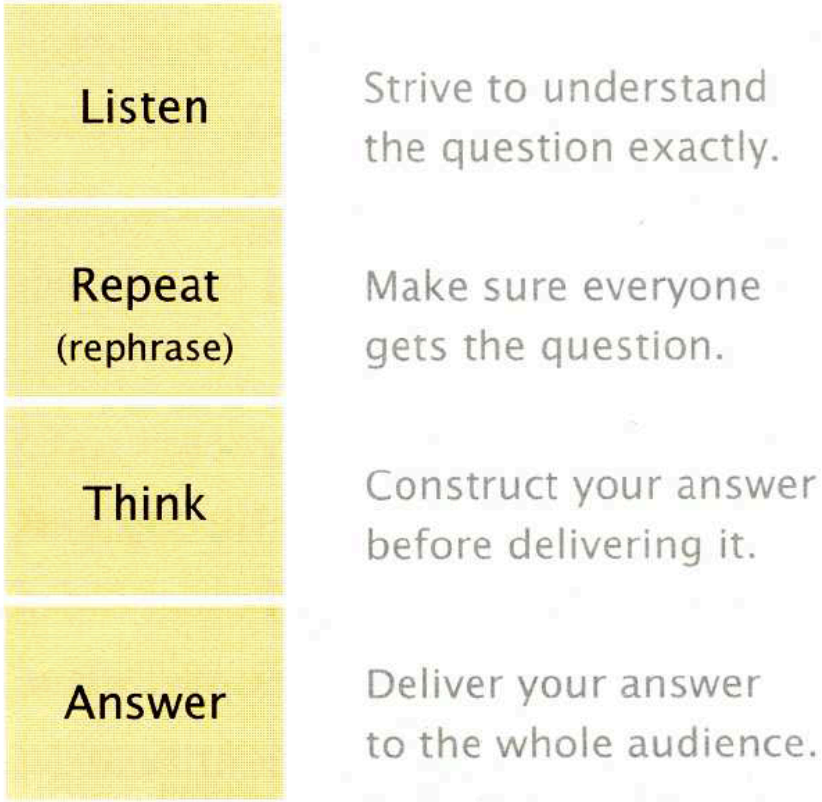
Visitation cannot be ensured simply by having the presenter wear attire that is colour-coordinated with the poster. However, the significance of our results suggests that colour coordination between the poster and the presenter's attire may substantially increase the popularity of the poster and the likelihood that the research will be disseminated.

Practice: it makes you organized and calm

- Simulate the real environment as closely as possible
- Get written comments from others

- As you talk/listen
  - Note what is not **crystal clear**
  - Note what feels out of order
  - Note where you get stuck or wordy
  - Note what you can remove (e.g., stuff that you don't describe may only distract)

Q&A



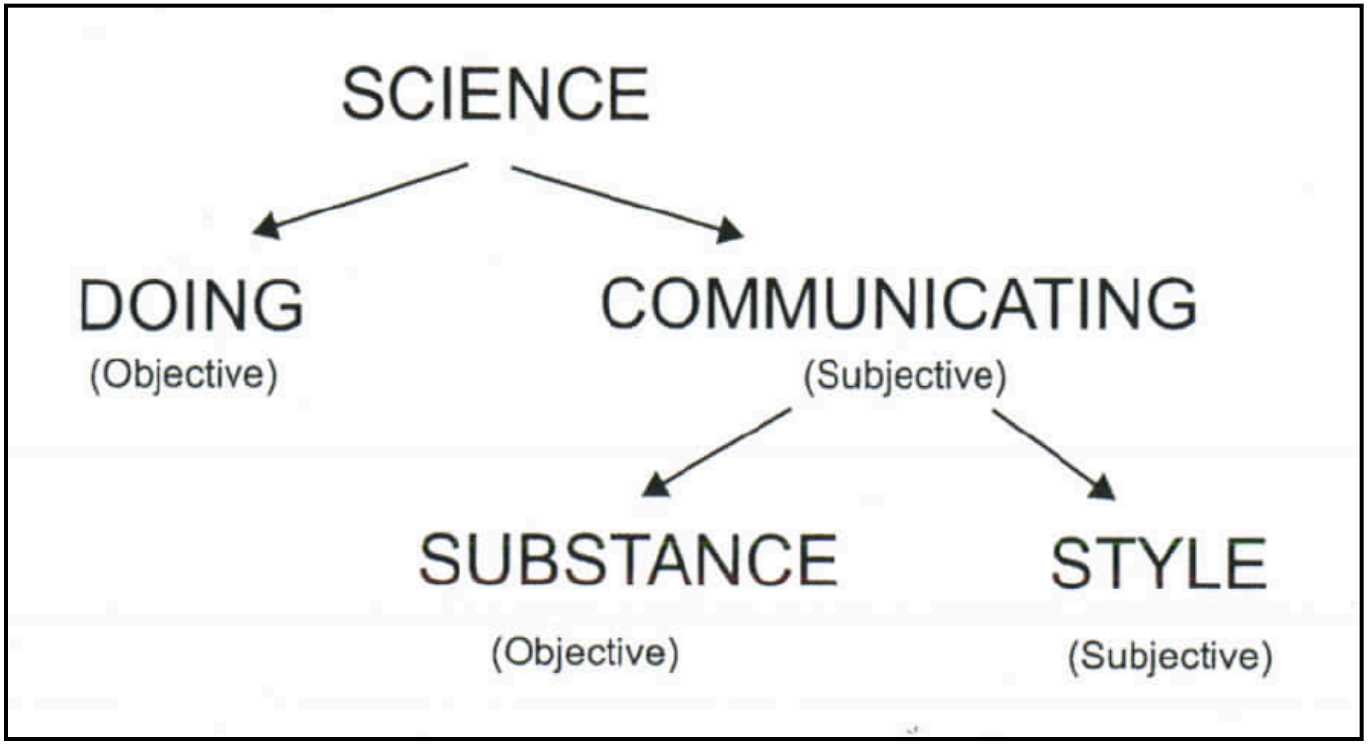
When you are under attack, remain calm and professional:

- quiet the atmosphere: mark a pause before you answer;
- acknowledge the questioner's concern (emotional level);
- disagree with the questioner's opinion (intellectual level).

The RFE presentation

- 15 minutes (of slides)
- Faculty examiners act both as generalists and specialists
- Prove that you can do independent research
  - WHAT: general and specific
  - WHY: general and specific
  - HOW: results (specific) and interpretation (specific and general)
  - WHAT NEXT …thinking ahead
- No mysteries!

Always keep this in mind, and adjust the balance according to your content and audience

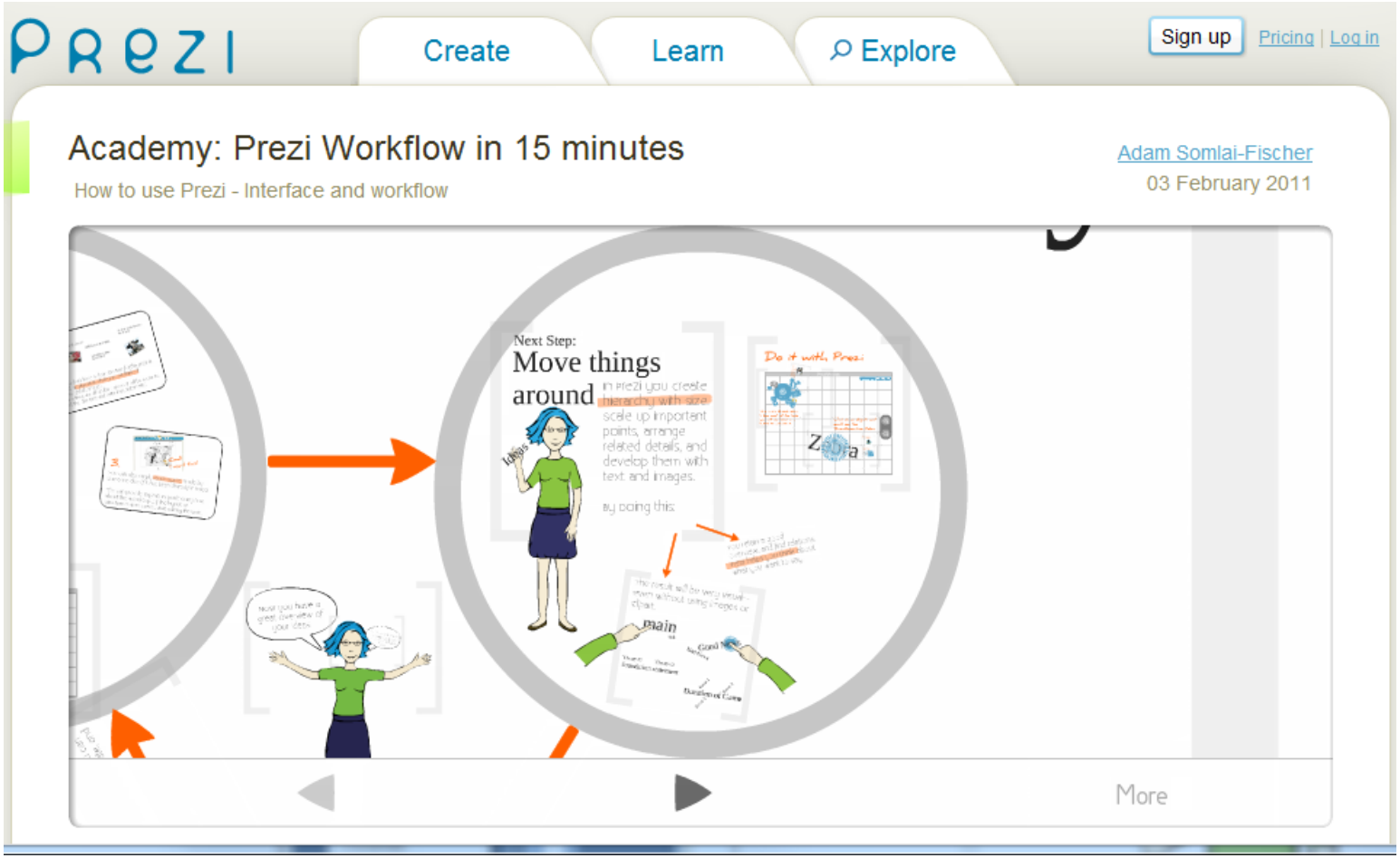


As a scientist or science communicator, you need to become "bilingual"—to be conversant in your area of specialty in both languages.

Randy Olson, Don't Be Such a Scientist

Prezi: presentations on a virtual canvas

- http://prezi.com
- http://prezi.com/zvsqdyisrcgt/academy-prezi-workflow-in-15-minutes/
- You can hire someone to make a prezi presentation for you like http://prezintations.com/



My favorite story about science communication

also at **http://www.youtube.com/watch?v=LGtJxwG00v4**

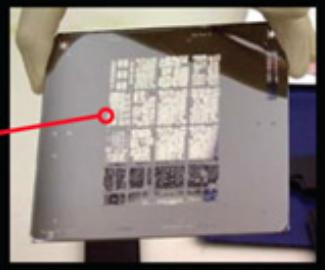
(0) image

Acc.V Spot Magn Det WD 500 µm
5.00 kV 3.0 60x SE 14.3 NANOBAMA

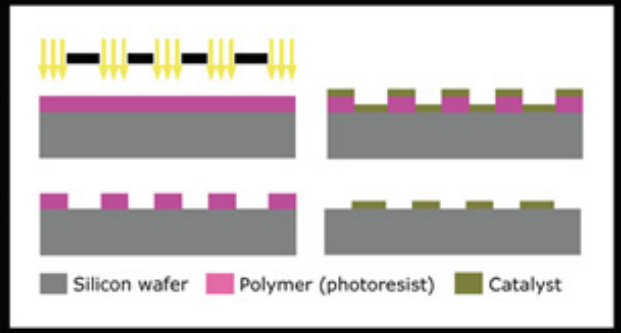
www.nanobama.com

(0) image

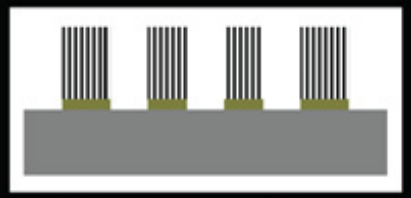
(1) line drawing



(2) mask



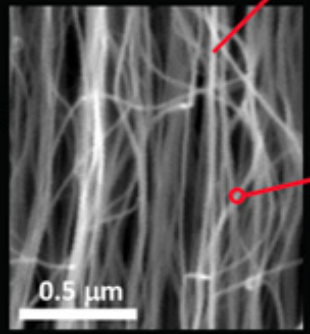
(3,4,5) photolithography and catalyst patterning

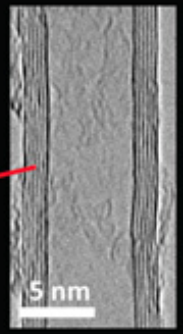


(6) grow nanotubes

(7) take pictures

closeup of nanotube "forest"





individual nanotube

www.nanobama.com

NANOSTRUCTURES

Welcome to nanobama

JOHN HART/SAMEH TAWFIK/MICHAEL DE VOLDER/ WILL WALKER/WWW.NANOBLISS.COM

The giant granite scu
Washington — the fi
United States — and
at Mount Rushmore
famous images in the
than 14 years and so
complete the 18-met
Now Barack Obama
the 44th president of
immortalized in carb

THE Sun
Monday, January 26, 2009
HOME | MYSun | MOBILE | SUN LITE | SITE MAP
NEWS
Forces
Royals
Sun Justice
Sun Money
Sun City
Captain Crunch
Columnists
NEWS
Tiny P

Microscopist.ru
Портал микроскопи
Избранное . Регистрация . Вход
500мкм-ый Обама из нанотрубок!

勝田敏彦】米ミシガ
台が、髪の毛の太さの
の炭素の筒カーボンナ
の、オバマ米次期大統
た。「ナノバマ」と題
写真、公開サイトから
チャーは、「08年を
の一つとして取り
ストを縮小した原画
たナノチューブででき
ジョン・ハート助教
がナノテクの応用例と
して作製した
肖像一つの大きさは約0・5㍉で、
ナノチューブの数は約1億5千万本。

「ナノバマ」Yes , we can

チームは「この
選の投票総数に
る。

NANOBAMA: PRÄSIDENT UNTERM MIKROSKOP

Fotostrecke starten: Klicken Sie auf ein Bild (11 Bilder)

Hart ist Professor am Department of Mechanical Engineeri
der University of Michigan. Er untersucht die genialen

smh.com.au
The Sydney Morning Herald

McCa
72

IMAGES OF THE YEAR

msnbc
featu

Technology & science / Science

You'll need a
Team of researchers
By Corey Williams
AP Associated Press

Technology

Gadgets Games @Home Biztech Security Connect

You are here: Home » Technology

Obama under the microscope

Nanobama Administration

How the world reacted

- Wow, nanotechnology is here!
- Let's show nanobama and talk about science policy.
- A political statement?
- It's just a cool art project.
- What a waste of money!

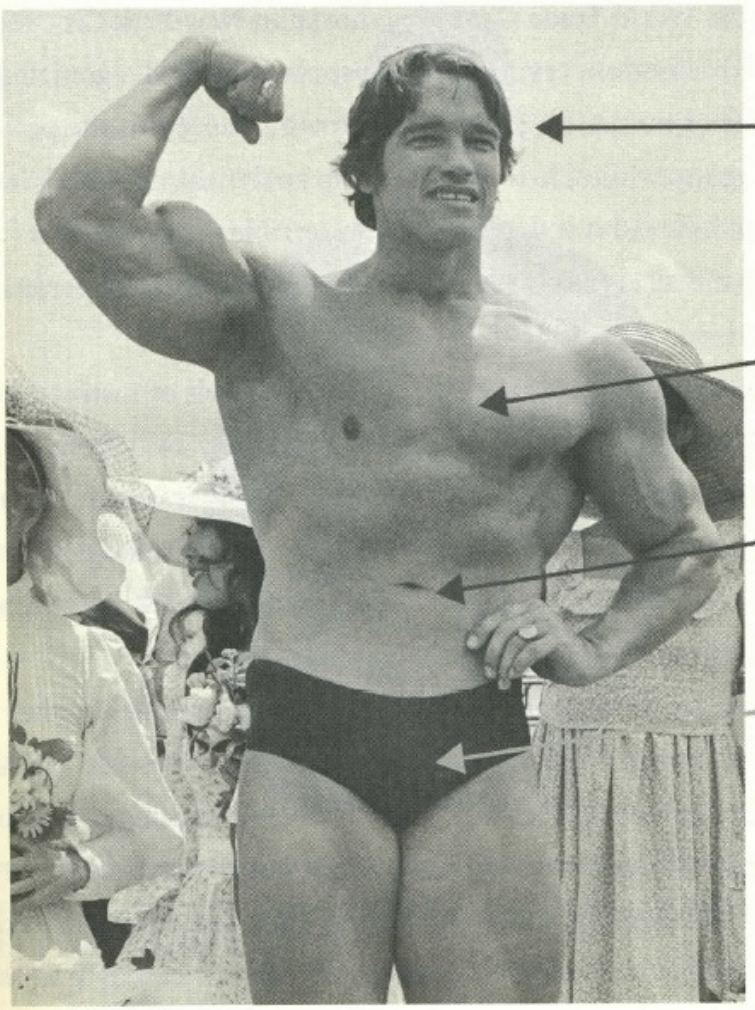
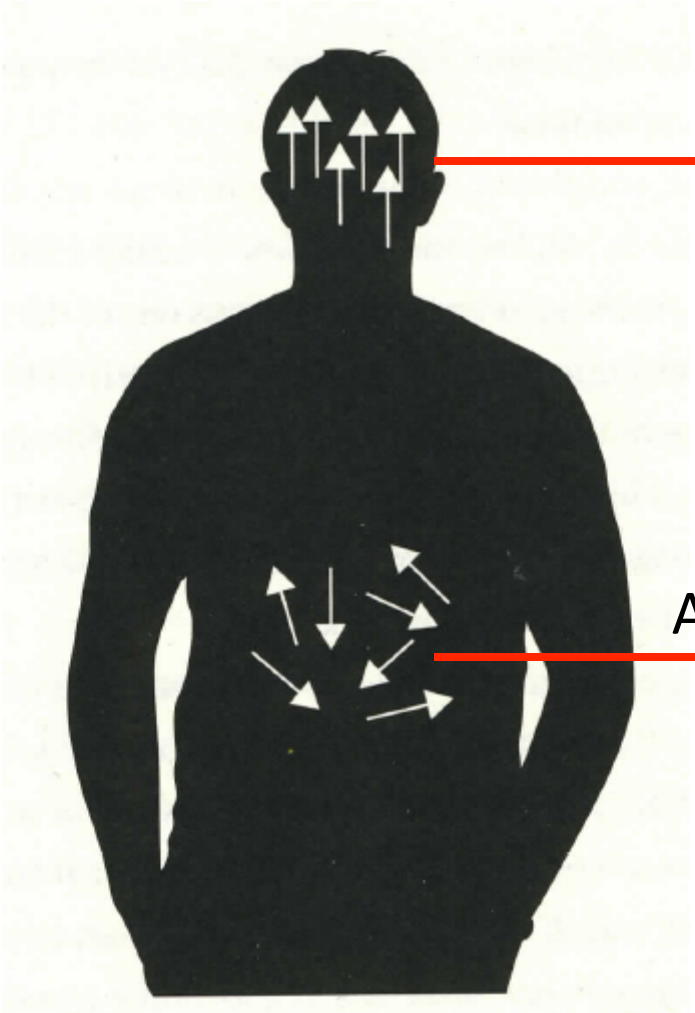
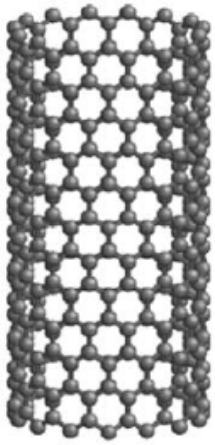


Figure 1-1. The four organs of mass communication. To reach the broadest audience, you need to move the process out of the *head* (1) and into the *heart* (2) with sincerity, into the *gut* (3) with humor and intuition, and, ideally, if you're sexy enough, into the *lower organs* (4) with sex appeal. Photo courtesy of © Mirkine/Sygma/Corbis.

Randy Olson, "Don't Be Such a Scientist"

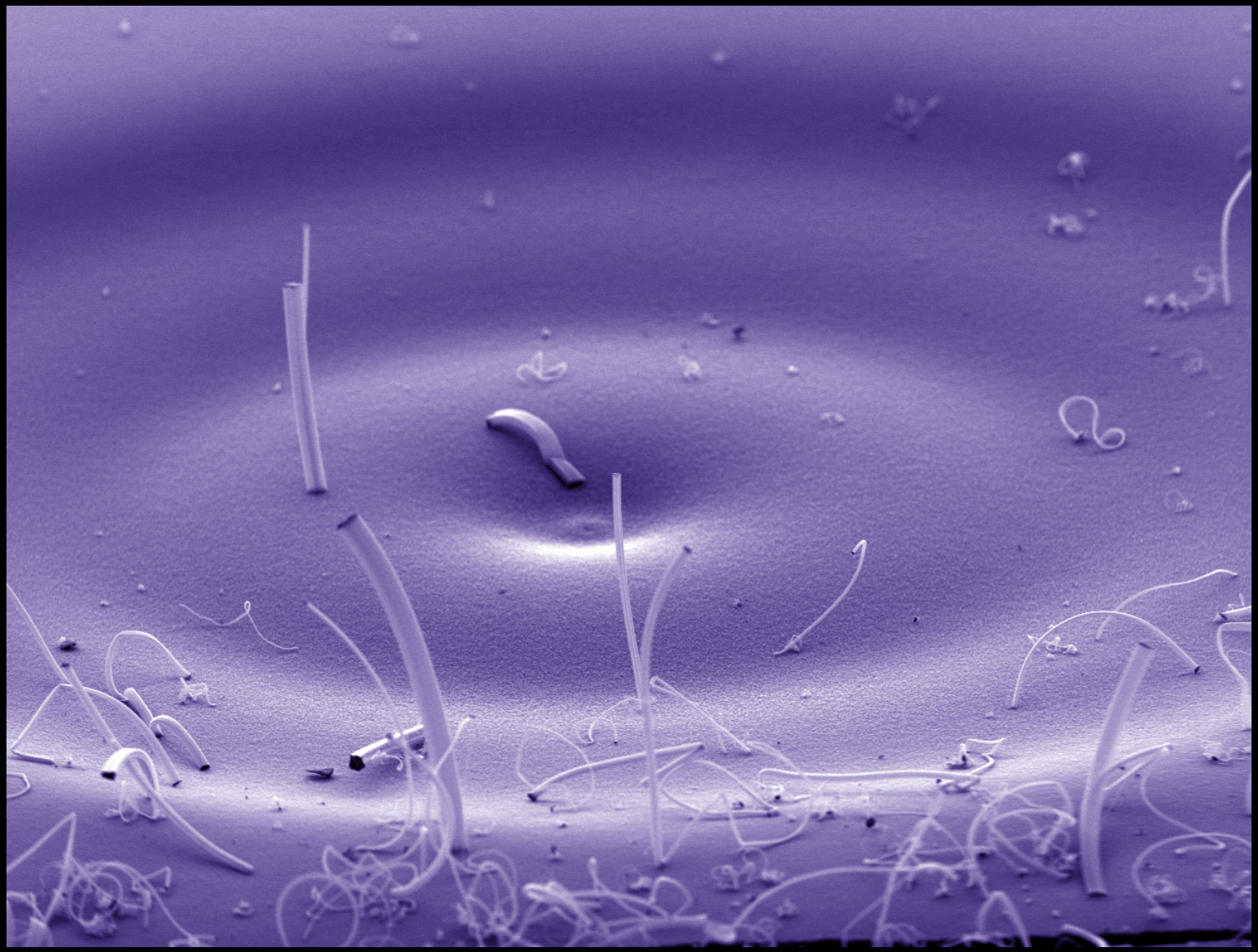


Randy Olson, "Don't Be Such a Scientist"



PCAST meeting on nanotechnology
White House, March 12, 2010

How can you make waves?



Homework

- I will email instructions about the proposal peer reviews; please complete them by Monday, April 9.