“A Conversation, Not A Lecture”

the science of science communication

ironically, mostly a lecture

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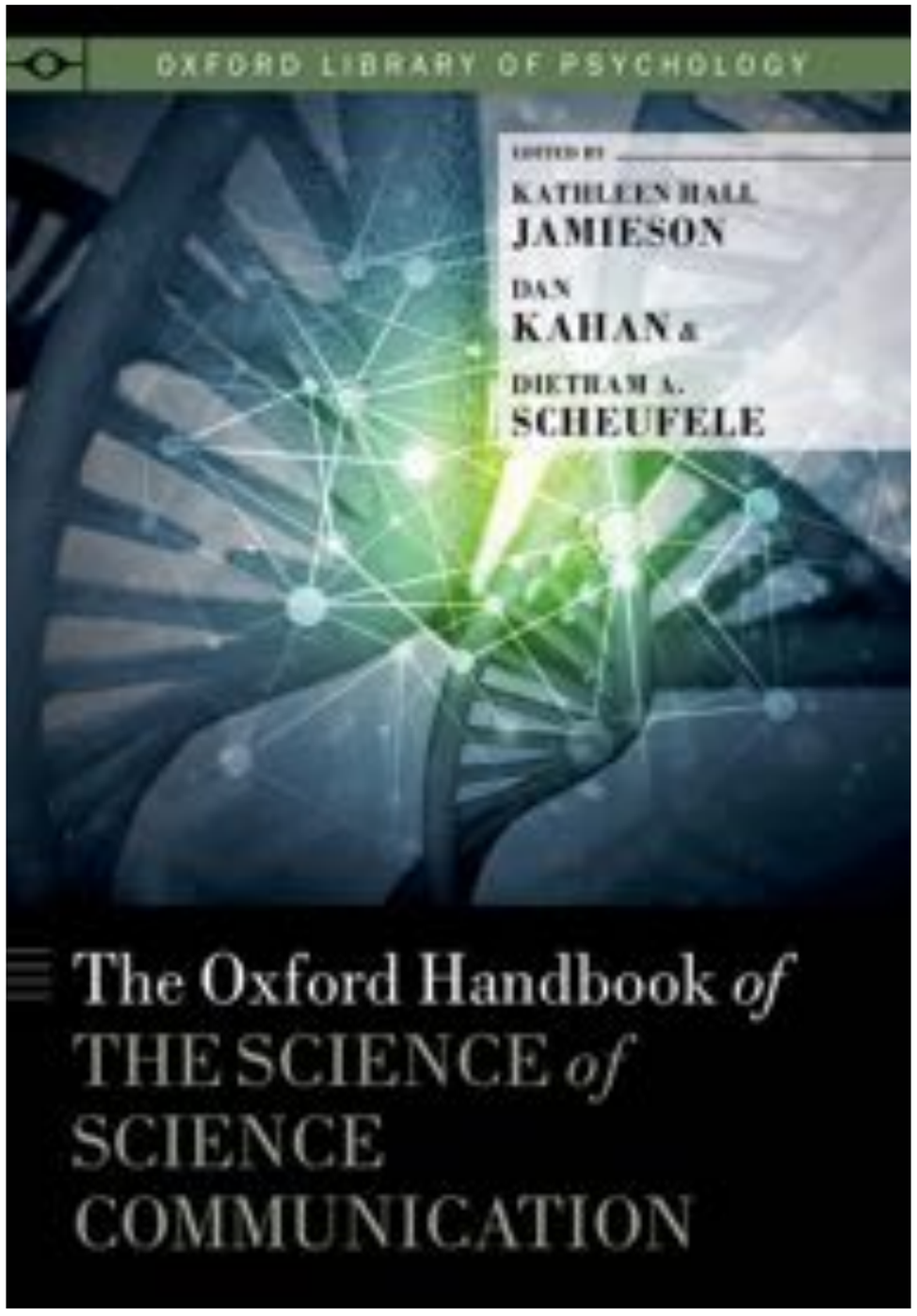
–Alan Leshner, CEO Emeritus, AAAS (2015)

like many textbooks:

expensive but useful!



What is science communication?

Discuss!

What is/are the goal(s) of science communication?

Discuss!

Models of Science Communication, Then and Now

Then: The Deficit Model

Goal: to increase science literacy amongst non-experts

Assumptions:

lack of support for or interest in science was due to lack of knowledge

transmission of information between scientists and interested non-scientists a linear process

Models of Science Communication, Then and Now

	knowledge deficit models
Actors	Scientists
Direction	comm *of* science
Content	Settled science

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No empirical evidence that knowledge is related to support of or engagement w/ science

views on science are complex, issue-dependent, and driven by personal values

Models of Science Communication, Then and Now

	knowledge deficit models	**dialogue and engagement models**	**communication in context**
Actors	Scientists	Scientists and engaged public	Wide variety of stakeholders
Direction	comm *of* science	comm *about* science	political debates that may or may not involve science
Content	Settled science	Science, incl. “perils and pitfalls”	science, but also ethical, regulatory, & political debates that may not have scientific answers

science communication now

What changed?

Nothing!

Human cognition

Everything!

The Internet
Media Crisis
Community norms

An extremely brief intro to human cognition

Humans use the least amount of information possible to make decisions

Heuristics:

cognitive shortcuts that humans use to process information

Most decisions are based on an approximation of understanding, not usually deliberative reasoning

Thinking is lazy (for everyone)

Most people make decisions through **motivated reasoning**:
balances desire for an accurate answer with confirmation of prior belief (confirmation bias)

Heuristics are an efficient way
for the mind to achieve this goal

Heuristics are not a “second best” way of processing information,
they are an adaptation that works really well

a few examples: ideology, trust, deference to authority

When are heuristics in play?

Always! But in particular:

Topics where listener has little prior knowledge

In saturated information environments

Listeners with lower numeracy

Topics where information can be fit (even if poorly) into existing model of understanding

"**System 1**" versus "**System 2**"

fast, intuitive

slow, deliberative

Forces restructuring the science communication environment

Media Crisis

The Internet

Community norms

Forces restructuring the science communication environment

Media Crisis ⟺ **The Internet**

Proliferation of information *platforms and creators*

Free information undercut business model of news outlets

Publications fired niche reporters (e.g. science journalists)

Science journalists pushed into freelance and/or PR

More pressure on scientists to communicate directly

Competition for attention —> conditions for hype

Targeted marketing & filters —> narrower audiences

Forces restructuring the science communication environment

Community norms

Greater focus on “broader impacts” from funding agencies

Communication prioritized at the federal level

Emergence of “new” kind of scientist?

Having said that: academia still primarily values publications

Incentives

Think of some of the types of science communication.

What motivates science communicators to communicate science?

Discuss!

Incentives for Science Communication

Institutional marketing/PR:

enhance visibility and reputation of institution

Funding/government agencies

justify often large expenditures on science
boost reputation via social good

Individual scientists:

fulfillment of responsibility
social good
visibility for self or institution
academic currency: publications

Incentives for Science Communication

While academic scientists sometimes look down on scientist-media interactions (the "Sagan Effect"), similar incentives are at work in peer-to-peer communication

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Statistical bias in publications:

nature

Criteria for publication

The criteria for publication of scientific papers (Articles and Letters) in *Nature* are that they:

- report original scientific research (the main results and conclusions must not have been published or submitted elsewhere)
- are of outstanding scientific importance
- reach a conclusion of interest to an interdisciplinary readership.

The Astrophysical Journal

Papers published in *The Astrophysical Journal* present the results of significant original research not previously published. Articles submitted to the Journal should meet this criterion and must not be under consideration for publication elsewhere. Commentary on previously published papers does not constitute significant original research. Authors are advised to examine carefully current issues

Hype:

Exaggeration of importance, benefit, or risk, for the purpose of publicity

hype is the result of an entire system of interacting incentives and mutually reinforcing factors from changes in media, science itself, and politics

All about hype

Old model:

media is mostly to blame; hype results because of *miscommunication* between scientists and media

Current model:

All parties contribute to hype!
Not a miscommunication at all - rational behavior

Hype within science's reputational hierarchy

Scientists compete to produce original knowledge
Peer review "certifies" originality, confers enhanced reputation
Enhanced reputation —> easier access to "resources"

Delicate balance between cooperation and competition

Media exist in a parallel hierarchy outside the accepted one

Rewards within this hierarchy (media attention, etc) are see as a violation of community norms

**If academic publishing is the coin of the realm,
media attention is sometimes seen as play money**

Hype within science's reputational hierarchy

HOWEVER

All parties participate in a communication landscape with blurry boundaries!

Hiring/tenure decisions based on citation counts and journal prestige fold in publication biases

Outreach events sometimes assume form of promotion, not just education

Press releases on new discoveries will always serve institution's interests

Communicating effectively in a complex communication landscape

Science communication is about

compressing information

guiding attention

The task is to make choices on what information to communicate and how to frame that information

The importance of framing

The “frame” of communication helps determine how a listener will process the information you present

The frame is the part you can control!

challenge is to choose frames that are consistent with the content of the research

Example: analysis of press releases about BP oil spill

Table 2
Main and sub themes in BP's press releases dealing with crisis.

Frames	Main themes	Sub themes	Examples
Official update	• State of well containment	• Well kill operations	Mechanical containment of oil spill; efforts to stop oil from continuing to spill into the Gulf
		• Marine life	Numbers of how many marine animals had been affected or killed by oil spill
		• Local citizens/jobs lost	Numbers on unemployment or personal loss of local citizens due to oil spill
Social responsibility	• Meet local needs	• Insurance service/claims	Specific explanations of BP insurance workers' responsibilities to help local citizens affected by the spill
		• State/local government initiatives	Monetary support for local government programs; money given to local Chamber of Commerce to boost tourism
Informational	• Mechanical work or changes to well	• Well containment	Very specific mechanical details of well operations; mechanical changes meant to stop spill
Philanthropic	• Monetary donation	• Research initiatives	Monetary donation for research on marine wildlife restoration after the spill
		• Social initiatives	Monetary/insurance relief for unemployed persons (due to spill)
Defensive	• Response to media	• Reactive	Specific releases geared toward responding to negative allegations made by news media outlets
		• Access	Specific boundaries set by BP to internal information; limiting media's access to certain information

Table 3.1: Science Communication Frames

Name of Frame	Definition
social progress	improving quality of life, or solution to problems. Alternative interpretation as harmony with nature instead of mastery, sustainability.
economic development/competitiveness	economic investment, market benefits of risk; local, national, or global competitiveness.
morality/ethics	in terms of right or wrong; respecting or crossing limits, thresholds, or boundaries.
scientific/technical uncertainty	a matter of expert understanding; what is known versus unknown; either invokes or undermines expert consensus, calls on the authority of 'sound science', falsifibility, or peer-review.
runaway science/Pandora or Frankenstein	call for precaution in face of possible impacts or catastrophe. Out-of-contrl, a Frankenstein's monster, or as fatalism, i.e. action is futile, path is chosen, no turing back.
public accountability/governance	research in the public good or serving private interests; a matter of ownership, control, andf/or patenting of research, or responsible use or abuse of science in decision making, politicization.
middle way/alternative path	around finding a possible compromise position, or a third way between conflicting/polarized views or options.
conflict/strategy	Defined science related issues as...a game among elites; who's ahead or behind in winning debate; war; battle of personalities or groups (usually journalist-driven interpretation)

Common frames in science communication

Example: citizen science

Tension between different perceptions of citizen science:

emancipative-participatory:

citizen science will alter social relationship between scientists and non scientists

instrumental-pragmatic:

citizen science (and citizen scientists) are a tool for accomplishing a goal, no social change

Example: citizen science

public

crowd

volunteers

citizens

Discuss:

How do each of these words frame participants in citizen science?

T. E. Suomela, “Citizen Science: Framing the Public, Information Exchange, and Communication in Crowdsourced Science"

Good news! Frames are effective

Well-chosen frames can help people understand your information better

Good news! Frames are effective

Well-chosen frames can help people understand your information better

Bad news! Frames are effective

more effective framing != more reasoned conclusions

science offers one way of understanding concepts & relationships, but it is not the only way of knowing

if other means help the person increase quality of life, they are unlikely to part with those adaptations

parting thoughts

Science is based on falsification;
human cognition is based on confirmation
(even if you are a scientist human)

Trust is an important asset,
but scientists misunderstand it:

trust is bestowed by an audience

credentials confer trust amongst scientists,
but commonality of interests or expertise
work better for most people

Problem: Understanding the Media

Science produces information slowly;
media operate on short timescale to get info out fast

Journalists must effectively communicate the 5W's:

When
Where
Who
Why
Ho**w**

Using the following prompt, write a news blurb that addresses the 5W's.

“Billy Jean” - Michael Jackson

She was more like a beauty queen
From a movie scene
I said, "Don't mind, but what do you mean
I am the one
Who will dance on the floor in the round?"
She said I am the one
Who will dance on the floor in the round

She told me her name was Billie Jean
As she caused a scene
Then every head turned with eyes that dreamed of being the one
Who will dance on the floor in the round

People always told me, "Be careful of what you do.
And don't go around breaking young girls' hearts."
And mother always told me, "A-be careful of who you love,
And be careful of what you do
'Cause the lie becomes the truth."

Billie Jean is not my lover
She's just a girl who claims that I am the one
But the kid is not my son
She says I am the one
But the kid is not my son

For forty days and for forty nights
Law was on her side
But who can stand
When she's in demand
Her schemes and plans
'Cause we danced on the floor in the round
So take my strong advice
Just remember to always think twice
(Do think twice, do think twice.)

She told, "My baby, we'd danced 'til three."
Then she looked at me
Then showed a photo of a baby cry
His eyes looked like mine, oh, no
Do a dance on the floor in the round, baby

A-people always told me, "Be careful of what you do
And don't go around breaking young girls' hearts."
(Don't break no heart.)
A-but she came and stood right by me
And just the smell of sweet perfume
And this happened much too soon
And she called me to her room

Billie Jean is not my lover
She's just a girl who claims that I am the one
But the kid is not my son
(No, no, no, no, no, no, no, no.)
Billie Jean is not my lover
She's just a girl who claims that I am the one
But the kid is not my son
She says I am the one
But the kid is not my son

She says I am the one
But the kid is not my son

No, no, no

Billie Jean is not my lover
She's just a girl who claims that I am the one
(No, there's not me, baby.)
But the kid is not my son
(No, no, no, no, no, no, no.)
She says I am the one (No, babe.)
But the kid is not my son, no, no, no

She says I am the one
You know what you did
She says he is my son
Breaking my heart, babe
She says I am the one

Billie Jean is not my lover
Billie Jean is not my lover
Billie Jean is not my lover

Problem: identifying frames

"Scientists need to speak clearly with journalists, who provide a great vehicle for translating the nature and implications of their work. Scientists should also meet with members of the public, and discuss what makes each side uncomfortable… scientists must respond forthrightly to public concerns… there needs to be a conversation, not a lecture. "

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Problem: identifying frames and emphasis in communication

Read press communications and analyze the framing being used by communicators

Hints:

Look for superlatives. Are they accurate?
Think about who is communicating, and to whom.
Think about motivation/goals of those communicating.

Bonus: is the communication “effective”?

Problem: communicating your own research

Choose one of your group member's projects from yesterday's data visualization and storytelling exercise.

Using that visualization as the centerpiece,
write a press release that uses an appropriate* frame

*"appropriate" will depend on what you want to communicate!