

The Genres of Scientific Storytelling

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August, 2018

The Opportunity



- ❖ Since the CSB report in 2011, there has been interest in a database which would allow people to share lab chemical safety “**Lessons Learned**” to benefit the lab community as a whole.
- ❖ Several professional organizations have taken on the challenge of developing such a platform, using a variety of approaches. In the process, we have learned a lot about the challenge of organizing such a database.
- ❖ Last year, we surveyed the chemistry community to see what they’re interested in.

2017



RESEARCH ARTICLE

Baseline survey of academic chemical safety information practices

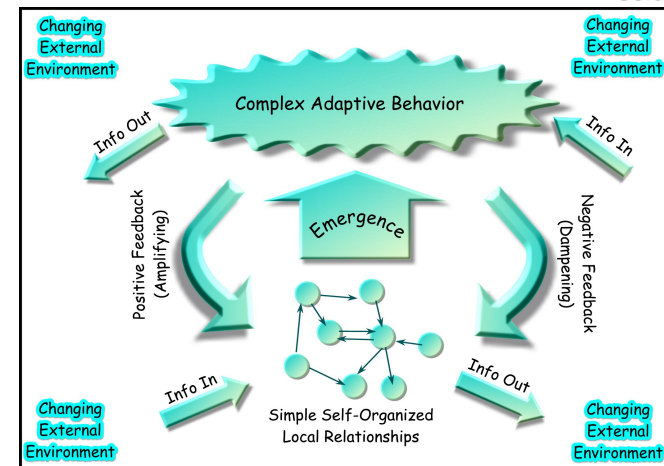
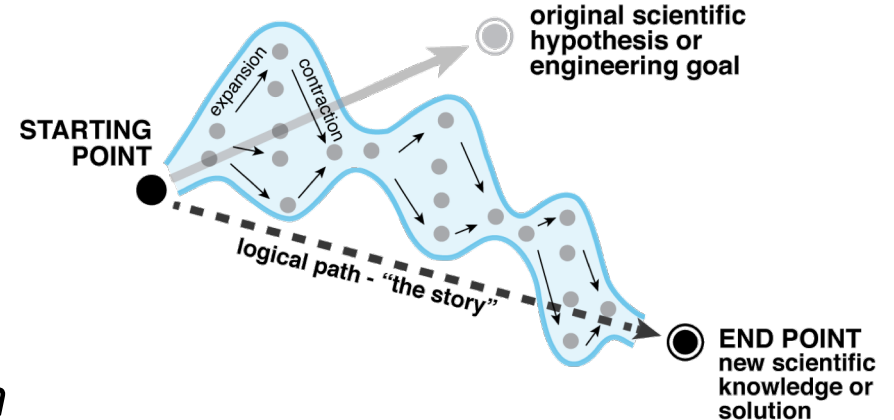
- 50% of respondents report that their organization gathers and uses LL from lab safety incidents; fewer report finding LL information helpful when developing an SOP
- 43% said that LL should include “**root-causes**” and have **chemists** involved in gathering this information

The Challenge of "Root Cause"



- “A common myth in safety holds that injuries are caused by one critical factor, **the root cause...**”
- “Conducting an investigation to find a **singular root cause could be considered bullying.** This approach can put employees on the defensive....”
- “An **analysis, not an investigation,** is needed to sort through the complex web of contributing factors.”

Telling a story involves throwing away information



Opportunities and Challenges of these Platforms

Aspect				
<i>Opportunities</i>	High technical and writing quality	Focused scope; review external to the laboratory but within the institution	Careful review; clear connection to institutional expectations	Lower stakes increases information flow
<i>Challenges</i>	Resources limit the number of investigations conducted	Public relations considerations; loss of information as lessons are generalized into best practices	Long turn around time; bureaucratic findings throw away even more information	Random errors are introduced, perhaps overcome by increased information

These examples remind us that
“The medium is the message”

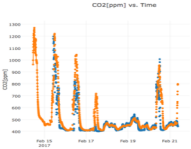

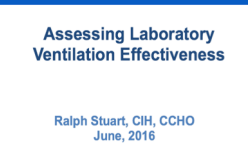

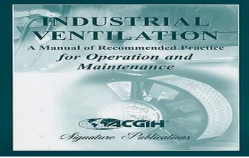

6 Popular Scientific Genres (with Lab Ventilation Examples)

		<p style="text-align: center;">Assessing Laboratory Ventilation Effectiveness</p> <p style="text-align: center;">Ralph Stuart, CIH, CCHO June, 2016</p>	<p style="text-align: center;">Assessing general ventilation effectiveness in the laboratory</p> <p style="text-align: center;">By Ralph Stuart, Eliza Sweet, Aarav Barchelder</p>		
<p style="text-align: center;">Raw Data: CO₂ vs time</p>	<p style="text-align: center;">Posters: Summary of uses of CO₂ as tracer</p>	<p style="text-align: center;">PowerPoint Presentation: Ventilation rate recommendations based on CO₂ tracer work</p>	<p style="text-align: center;">Peer Reviewed Papers: General Method for collecting and analyzing data</p>	<p style="text-align: center;">Science Texts: Principles of ventilation design and assessment</p>	<p style="text-align: center;">Science Fiction: Discussion of "extractor fans" as part of character development</p>

←
 Increasingly specific;
more information

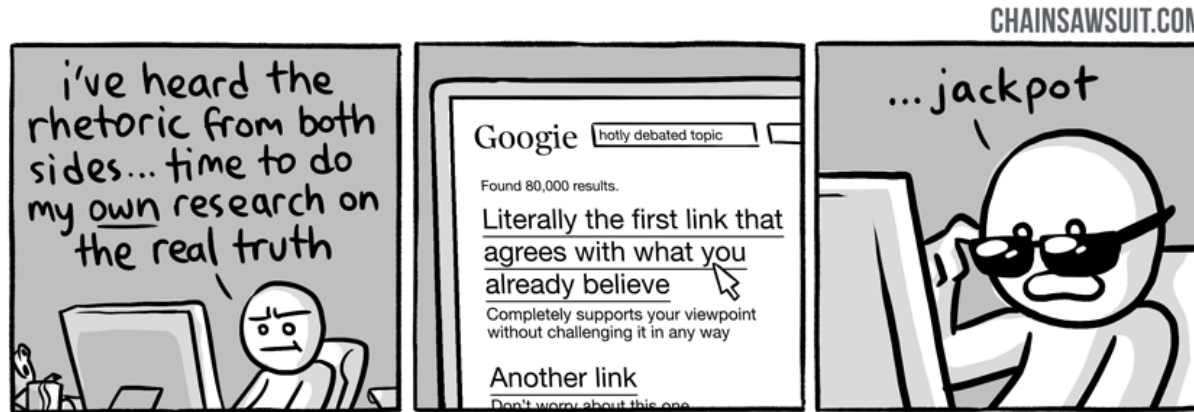
 Increasingly general;
more transferable
 →

Key Attributes of Scientific Media

Aspect						
<i>Authors and Audience</i>	One person; small (<5) team	Small team; 10's of visitors	One person; scores in audience	Writing team and peer reviewer(s); 100's of people	Editorial team to write; 1000's of students in audience	Hundreds of people to create; millions in audience
<i>Goal</i>	Start a conversation about data interpretation	Discuss work with interested audience	Present a technical case	Share methods and observations	Support teaching within a grading system	Explore future social impacts of science
<i>Style</i>	Pure technical information	Mix of technical and graphic elements	Segmented story telling	Prescribed by scientific tradition	Built for the generic student	Technical information with drama added to connect dots
<i>Pre-Requisites</i>	Description of method	Conversation with author	Specific interest in topic	Significant education required	Some education and mentoring	Willingness to suspend disbelief

Which is Best?

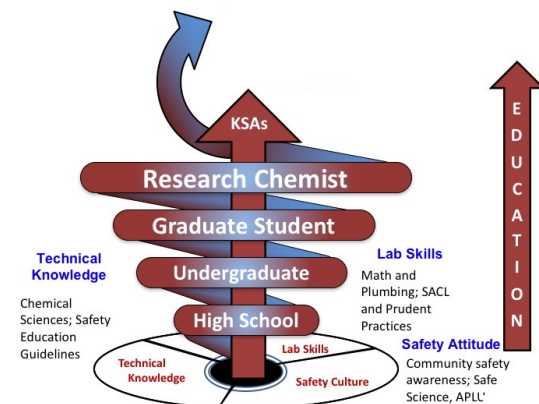
Depends on Your Cognitive Biases



Cognitive Biases arise from one's education;
often in unrecognized ways



R Hill, D Finster. *Laboratory Safety for Chemistry Students, 2nd Edition*,
John Wiley & Sons, Hoboken, NJ, 2016



What We Are Teaching Scientists about communication?

Distribution of the most common writing assignments in undergraduate science syllabi.

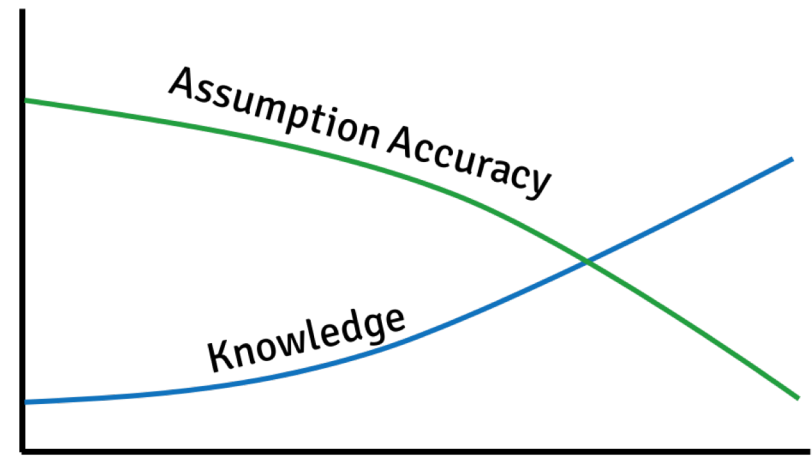
Data from:
The Genre Project at the UNC Writing Program



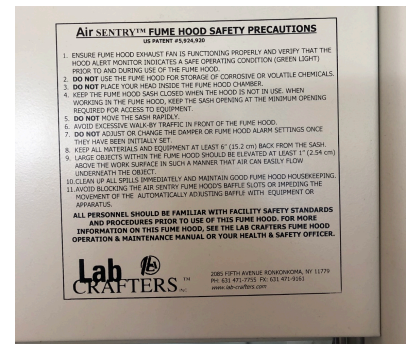
The grading system builds a specific set of cognitive biases

Working with Cognitive Biases to (De)Motivate Attention to Information

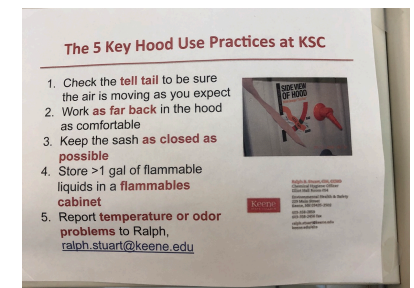
- **The Curse of Knowledge:** is a cognitive bias that occurs when an author assumes that the others have the background to understand the limits of what they're saying
- **The Lab Vent example:** The cognitive overload of fume hood instructions
- **The Alternative:** Drama holds the audience's attention with plot twists that confound or affirm their cognitive biases



ExplainerAcademy.com



11 Precautions



5 Practices

Cognitive Biases and Information Retention

- The **Wundt Curve** describes the strength of a media message over time.
- **Extreme Re-listening** research quantified the importance of tone in holding people's attention
- 204 participants report average re-listening of 303 times total.
- 43% listen to their favorite song daily; the average number of re-listens is 3 times/day.

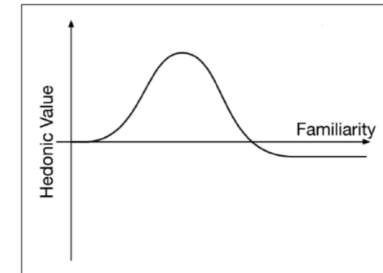


Figure 1. Wundt curve.



Happy

- 174 listens
- 13% recall



Calm

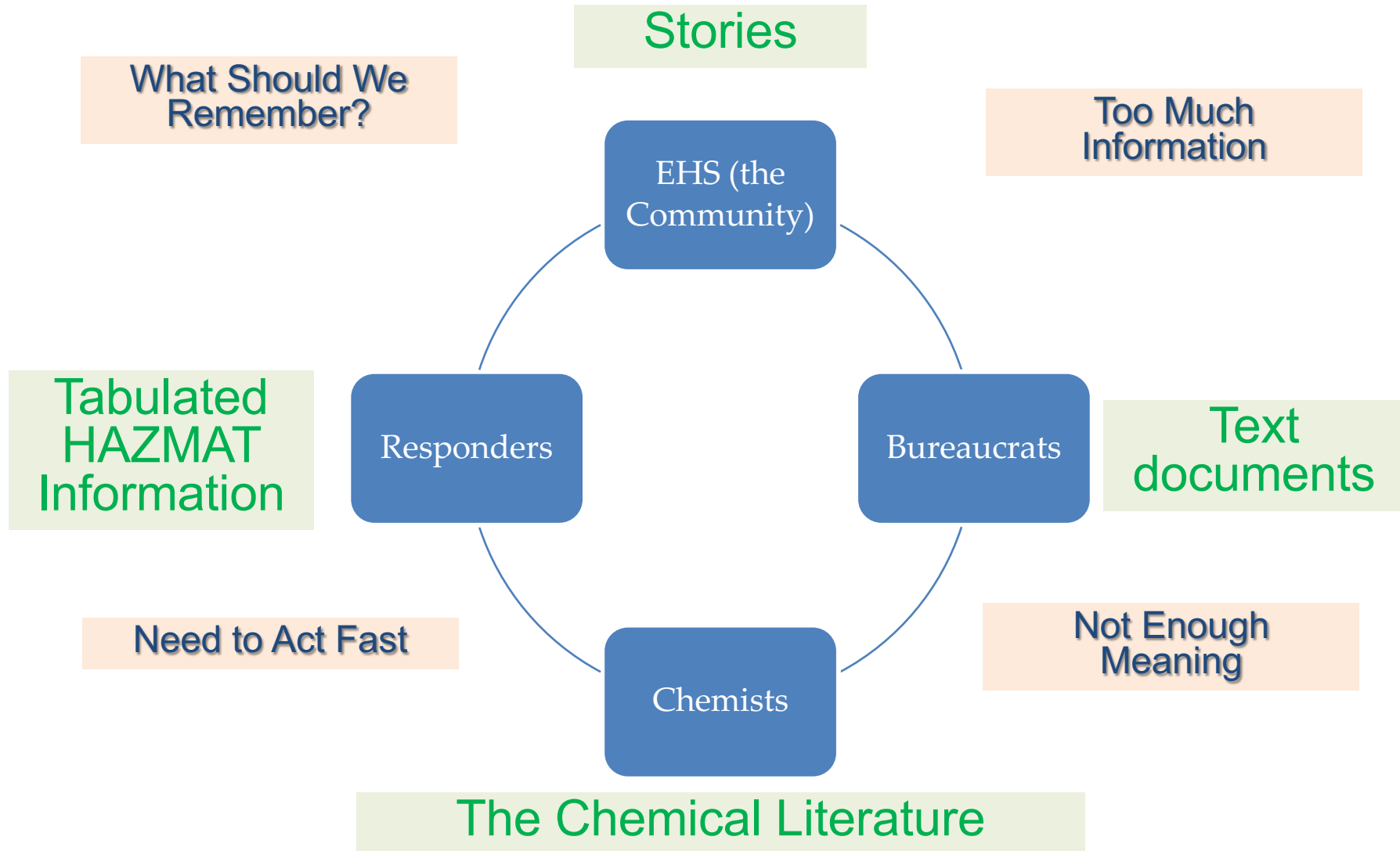
- 515 listens
- 12% recall



Bittersweet

- 790 listens
- 30% recall

Media that Respond to Cognitive Biases of Specific Stakeholders



Meeting the Opportunity

It seems unlikely to me that a database of Lessons Learned by itself will bridge the gap between cognitive biases and institutional values; What Can?

**Institutional
Values
Statements**
*(i.e. strategic
plans, policy
statements, etc.)*



**Individuals'
Decisions
Based on
Cognitive
Biases**

Well done videos use multiple elements
to leverage the cognitive biases of a diverse audience