Dr. Dawn Wright @deepseadawn

THE STORY COLLIDER

TRUE, PERSONAL STORIES ABOUT SCIENCE

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Nov 3, 2017

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With the best Artistic Director in the world, ever, Erin Barker

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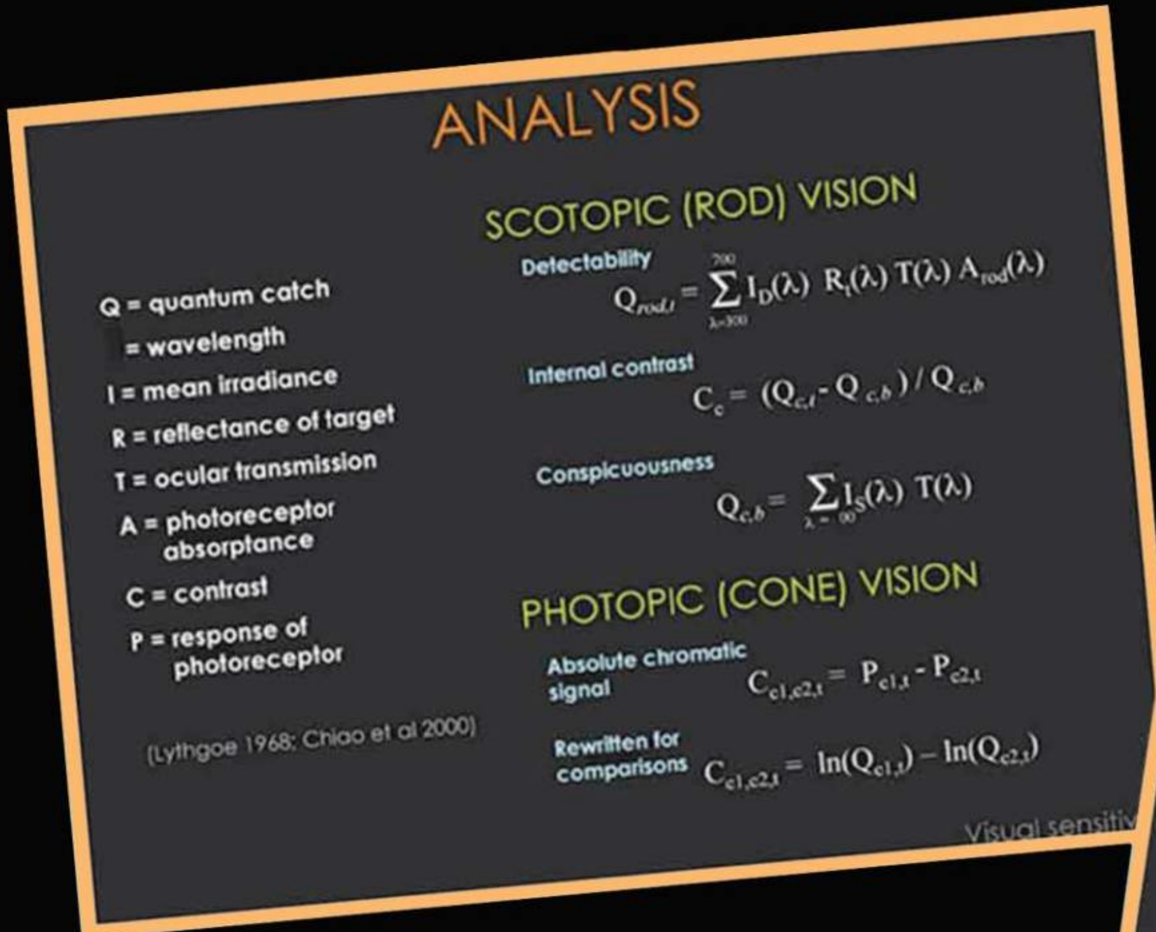
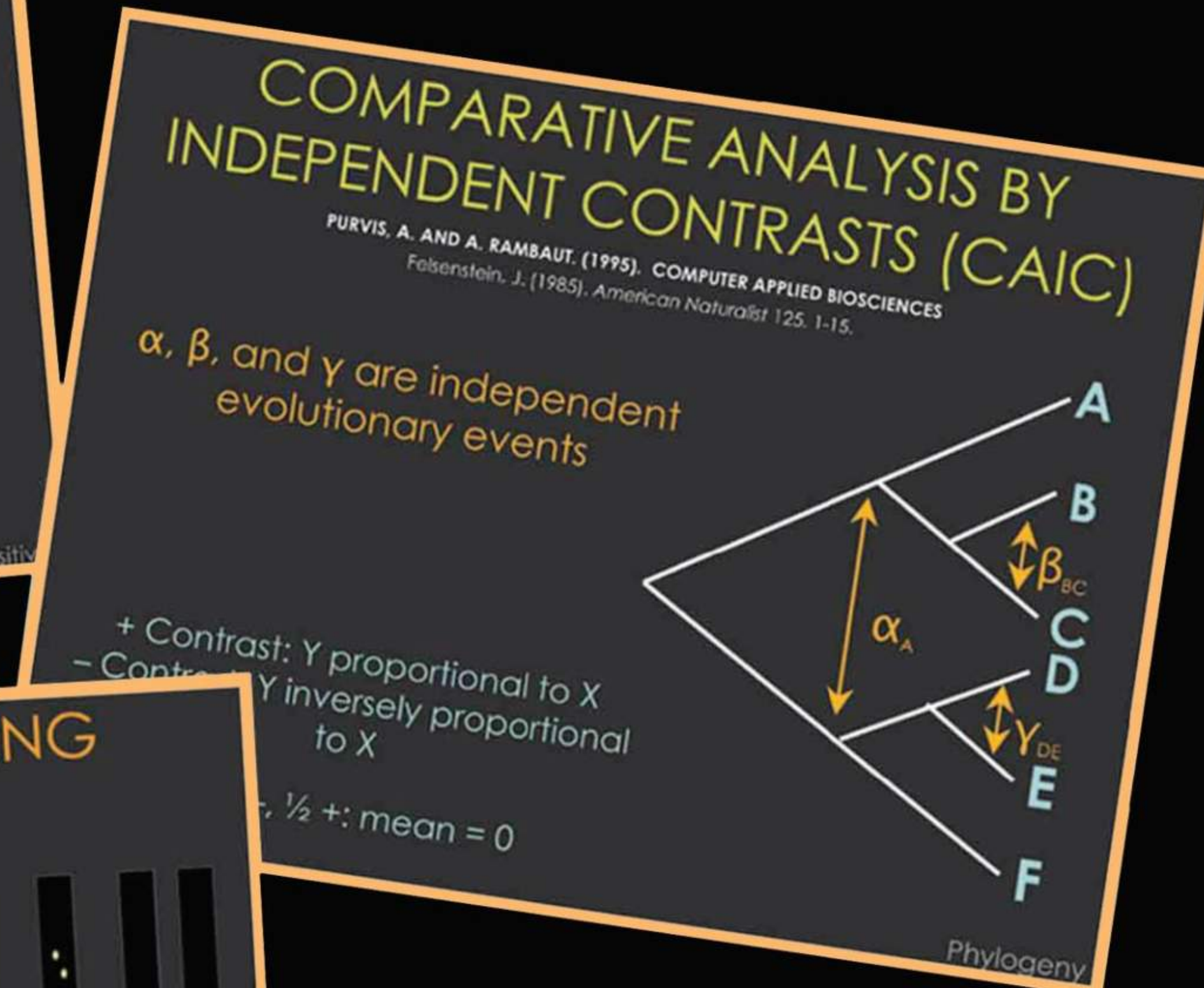
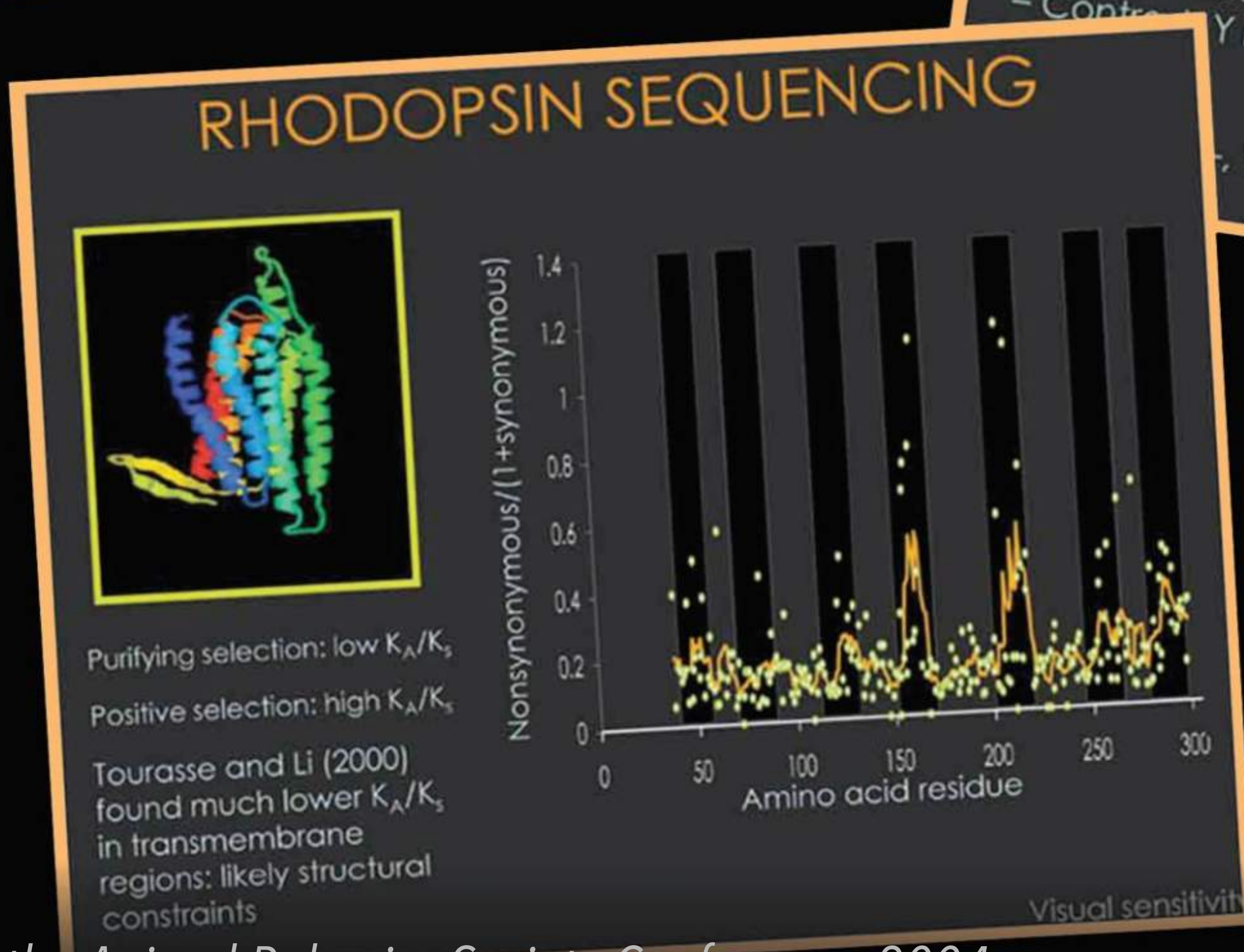
Yours truly - 25′ below sea level. La Paz, Mexico

Cortez rainbow wrasse – *Thalassoma lucasanum* – terminal male





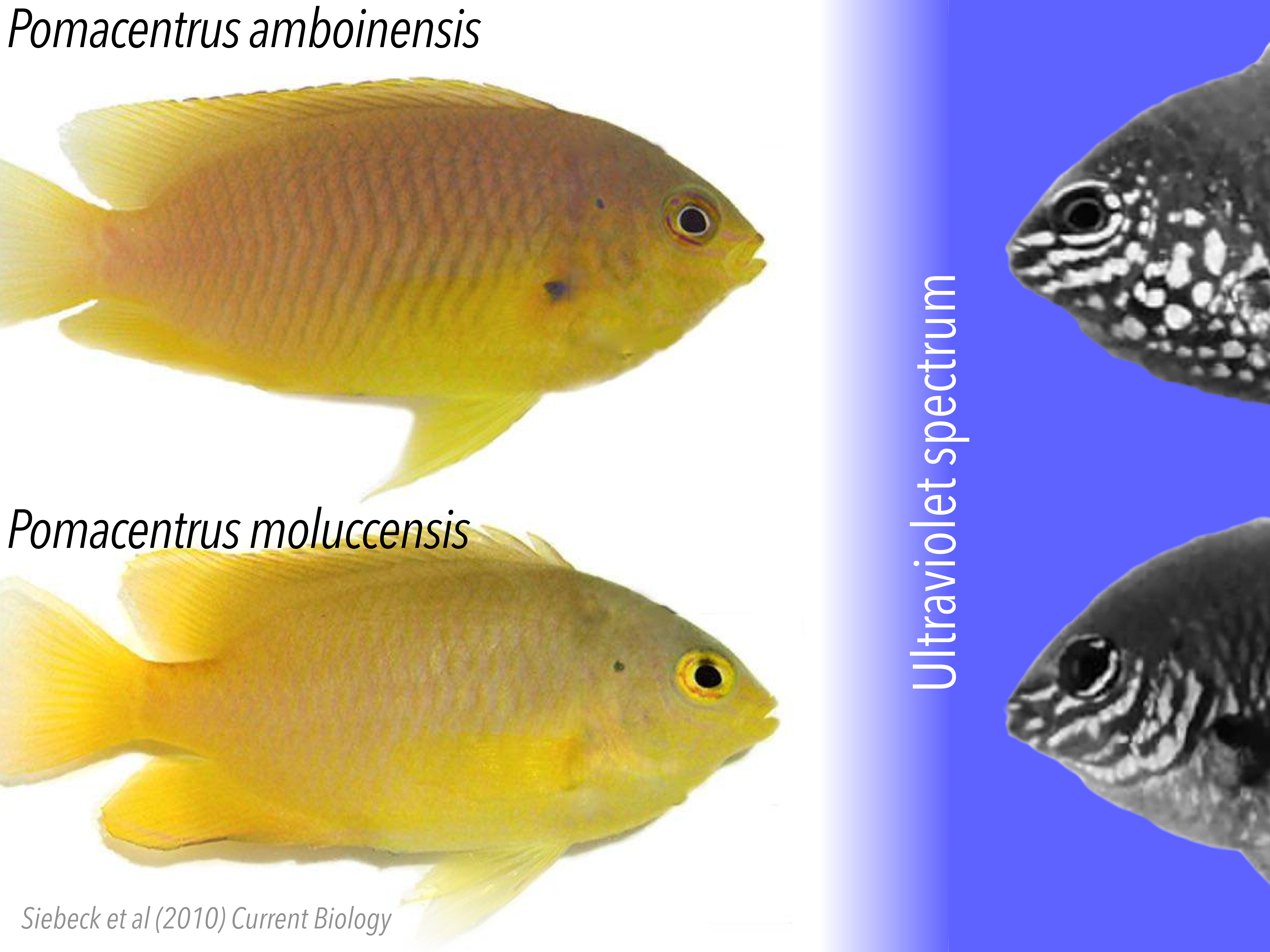


My slides for the Animal Behavior Society Conference, 2004 signal:noise

Pomacentrus amboinensis

Pomacentrus moluccensis

Siebeck et al (2010) Current Biology


Pomacentrus amboinensis
Pomacentrus moluccensis
Ultraviolet spectrum
Siebeck et al (2010) Current Biology

umwelt

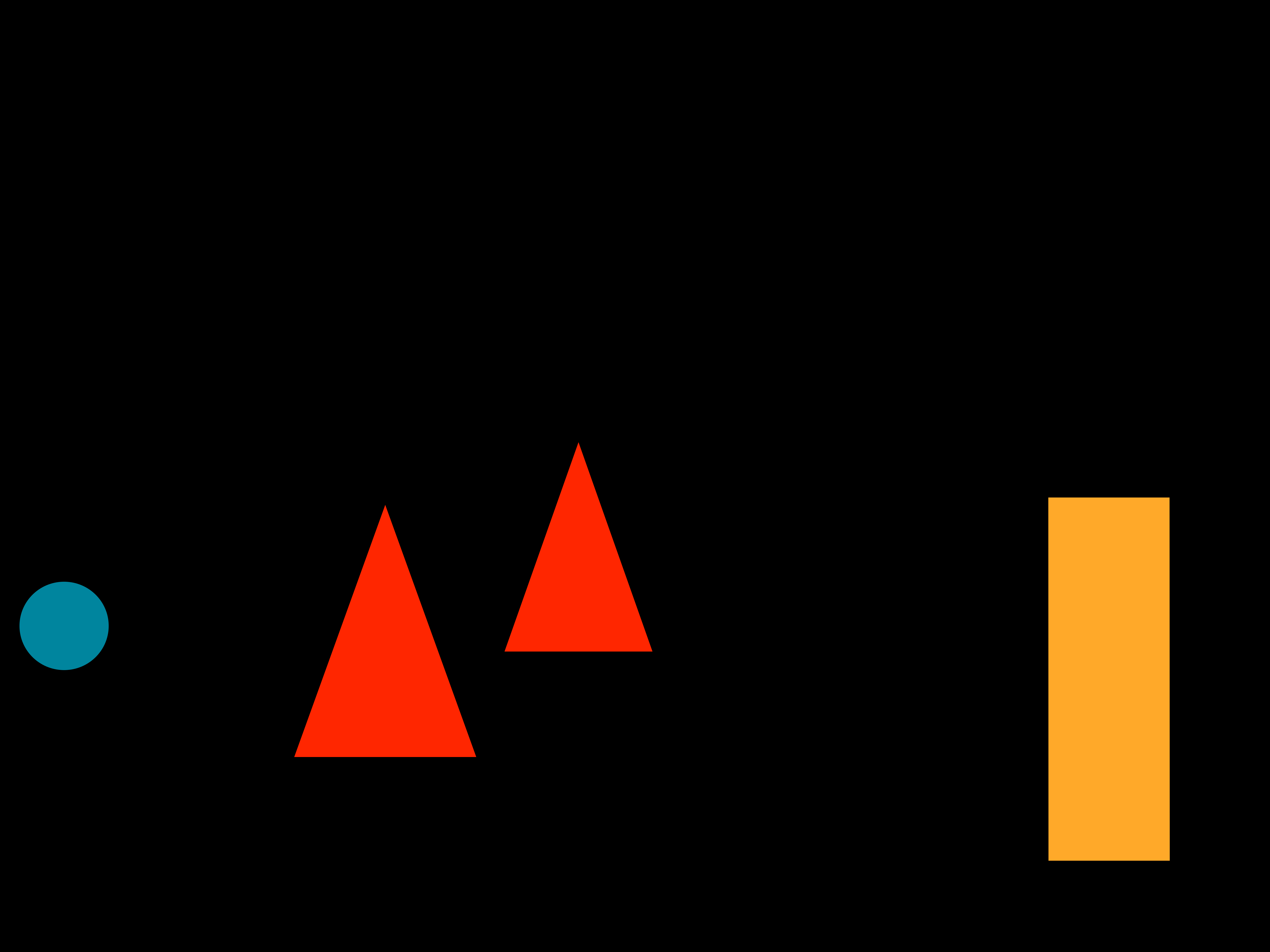
LEARNING

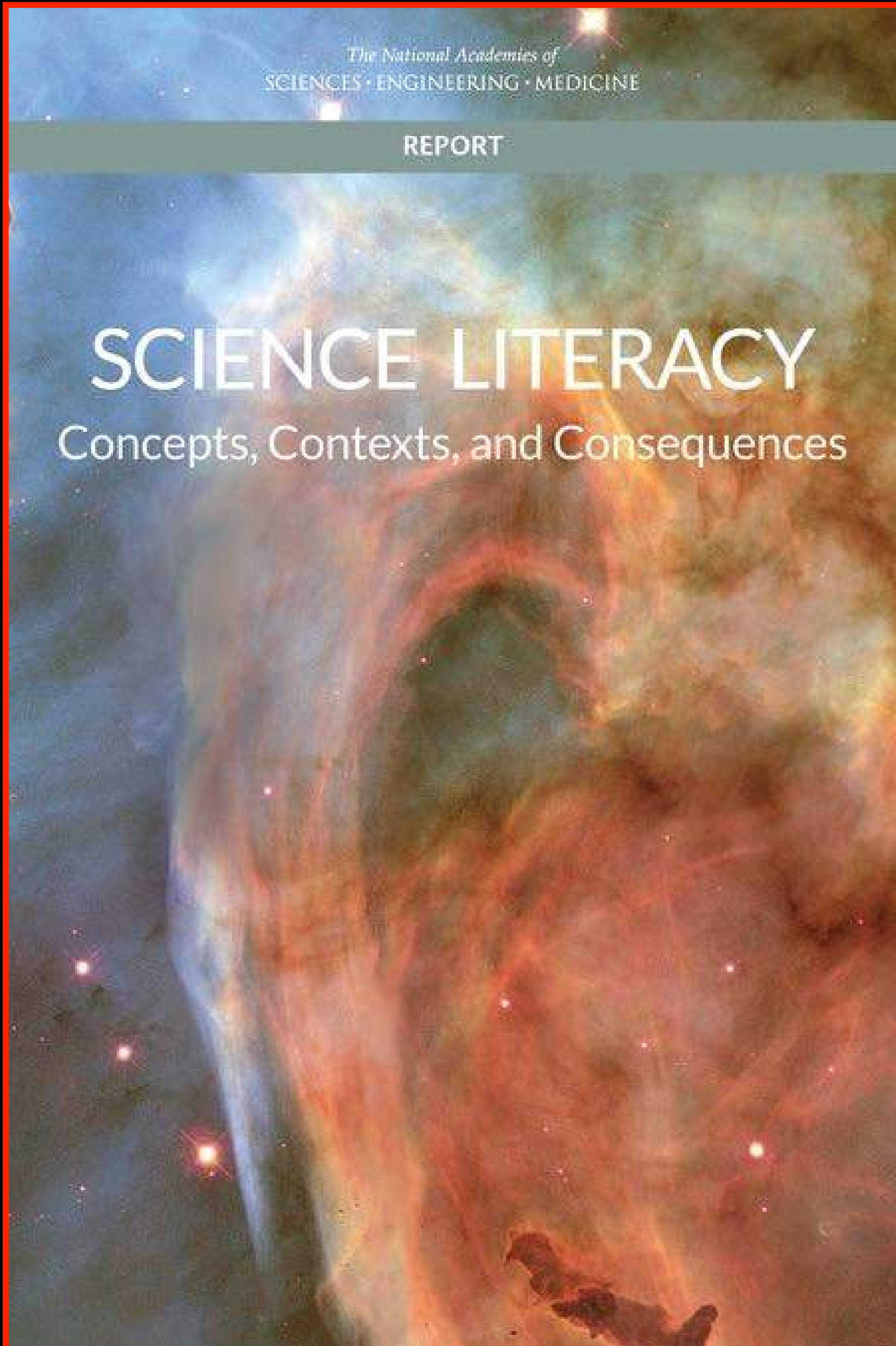
what happens

$$\Delta V = \alpha\beta(\lambda - \Sigma V)$$

salience & speed

what you expect




The National Academies of
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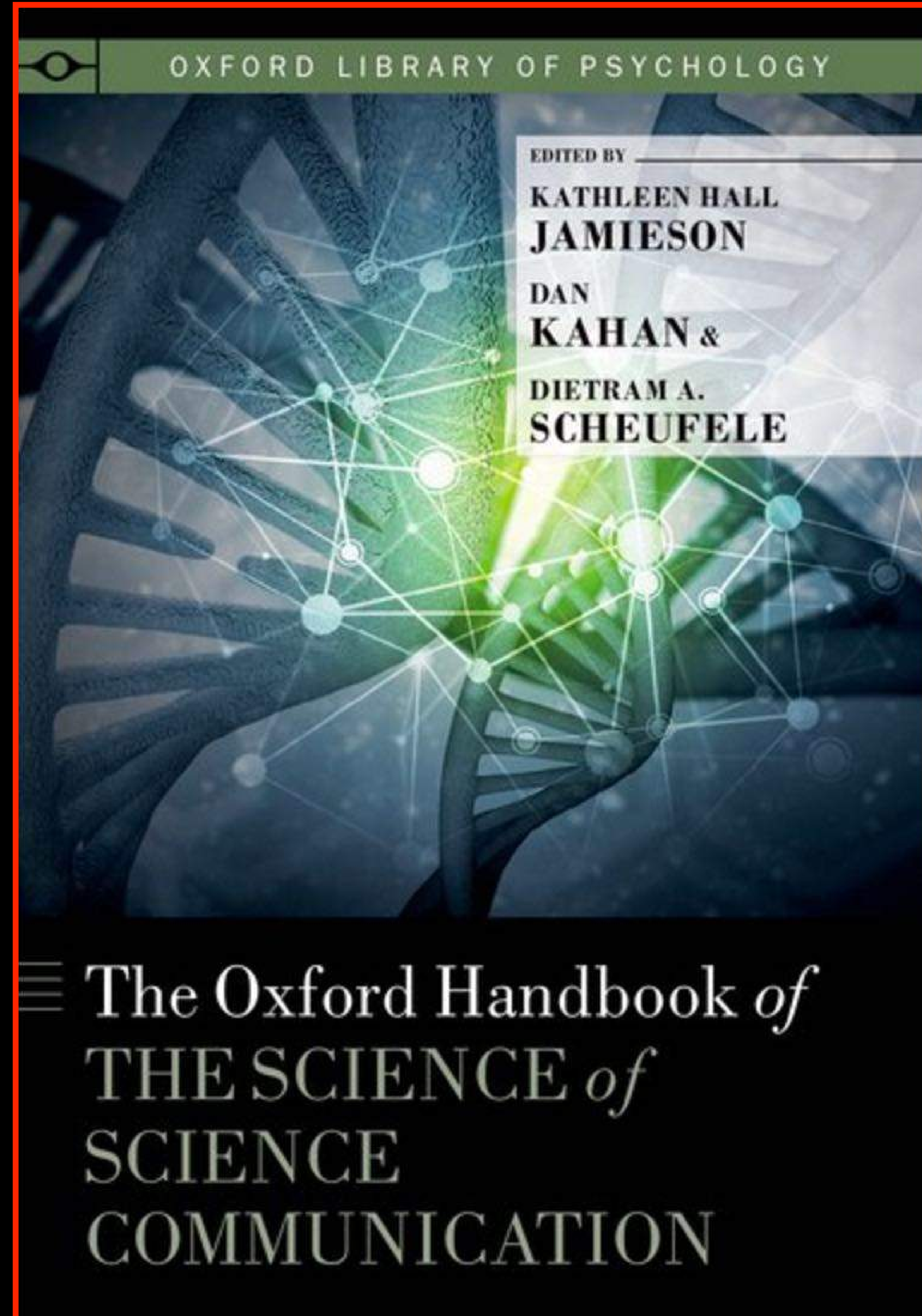
Concepts, Contexts, and Consequences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The Oxford Handbook of
THE SCIENCE of
SCIENCE
COMMUNICATION

"Research suggests that narrative communication is encoded using a unique cognitive pathway"

stories are:

- more interesting
- more understandable
- more believable
- more persuasive

Dahlstrom & Ho (2012). Ethical considerations of using narrative to communicate science. Science Communication, 592–617.

Using narratives and storytelling to communicate science with nonexpert audiences

Michael F. Dahlstrom[1]

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Edited by Dietram A. Scheufele, University of Wisconsin-Madison, Madison, WI, and accepted by the Editorial Board April 7, 2014 (received for review November 1, 2013)

Although storytelling often has negative connotations within science, narrative formats of communication should not be disregarded when communicating science to nonexpert audiences. Narratives offer increased comprehension, interest, and engagement. Nonexperts get most of their science information from mass media content, which is itself already biased toward narrative formats. Narratives are also intrinsically persuasive, which offers science communicators tactics for persuading otherwise resistant audiences, although such use also raises ethical considerations. Future intersections of narrative research with ongoing discussions in science communication are introduced.

persuasion | ethics

Storytelling often has a bad reputation within science (1). Viewed as baseless or even manipulative, stories are often denigrated with statements such as, "the plural of anecdote is not data." Such a perspective is valuable within the context of scientific data collection to underscore the important difference between making informed generalizations from systematically sampled populations versus overgeneralizations from small and often biased samples.

However, when the context moves from data collection to the communication of science to nonexpert audiences, stories, anecdotes, and narratives become not only more appropriate but potentially more important. Research suggests that narratives are easier to comprehend and audiences find them more engaging than traditional logical-scientific communication (3, 4). More pragmatically, the sources from which nonexperts receive most of their science information are already biased toward narrative formats of communication. Once out of formal schooling, nonexpert audiences get the majority of their scientific information from mass media content (5). Because media practitioners have to compete for the attention of their audiences, they routinely rely on stories, anecdotes, and other narrative formats to cut although the information clutter and resonate with their audiences. Although the plural of anecdote may not be data, the anecdote has a greater chance of reaching and engaging with a nonexpert audience. The challenge for science communicators, then, is to decide when and how narratives can effectively and appropriately help them communicate to nonexperts about science.

The purpose of this article is to synthesize literature on narrative communication and place it within a science communication context. The article begins with a review of narrative literature, as well as the mass media context through which most nonexpert audiences get their information about science. The article then reviews the potential persuasive impacts of narrative communication and the ethical considerations of using narrative to communicate science. Finally, future intersections of narrative with ongoing questions in science communication are introduced.

Narratives

Most individuals have an inherent understanding of what it means to tell a story. Communication scholars supplement this colloquial understanding of narrative through the articulation of certain factors that distinguish narrative as a communication format. Narratives follow a particular structure that describes the cause-and-effect relationships between events that take place over a particular time period that impact particular characters. Although there exist more nuanced factors that scholars can use to further determine the narrativity of a message (6–8), this triumvirate of causality, temporality, and character represents a fairly standard definition of narrative communication. Such a definition is independent of content and so narratives can be present within almost any communication activity or media platform. Obvious examples include interpersonal conversation, entertainment television programs, and news profiles, but narratives can also present themselves within larger messages as testimonials, exemplars, case studies, or eyewitness accounts.

Narratives are often contrasted with other formats of communication, such as expository or argumentative communication (7), or with other types of explanations, such as descriptive, deductive, or statistical (6). However, more generally, narratives are often contrasted with the logical-scientific communication underlying most of the sciences (3, 9). Three areas in particular where logical-scientific and narrative formats differ are in their direction of generalizability, their reliance on context, and their standards for legitimacy.

Logical-scientific communication aims to provide abstract truths that remain valid across a specified range of situations. An individual may then use these abstract truths to generalize down to a specific case and ideally provide some level of predictive power regarding that specific. Narrative communication instead provides a specific case from which an individual can generalize up to infer what the general truths must be to permit such a specific to occur (3, 10). In essence, the utilization of logical-scientific information follows deductive reasoning, whereas the utilization of narrative information follows inductive reasoning.

Logical-scientific communication is context-free in that it deal
with the understanding of facts that retain their meaning
dependently from their surrounding units of information
such, these facts represent the meaningful unit of content ar
be excised from a larger message and inserted into othe
sages, or even presented alone, with little loss of unders
In contrast, narrative communication is context-depen
cause it derives it meaning from the ongoing cause-a
structure of the temporal events of which it is comprised
As such, it is much harder to break a narrative int
units of meaningful content without either greatly al

This paper results from the Arthur M. Sackler Colloquium of the Nationa
Sciences, "The Science of Science Communication II," held September 23–2
National Academy of Sciences in Washington, DC. The complete progr
recordings of most presentations are available on the NAS website at w
org/science-communication-II.

Author contributions: M.F.D. wrote the paper.

The author declares no conflict of interest.

This article is a PNAS Direct Submission. D.A.S. is a guest edito
Editorial Board.

[1]Email: mfd@iastate.edu.

generalizability

context

legitimacy

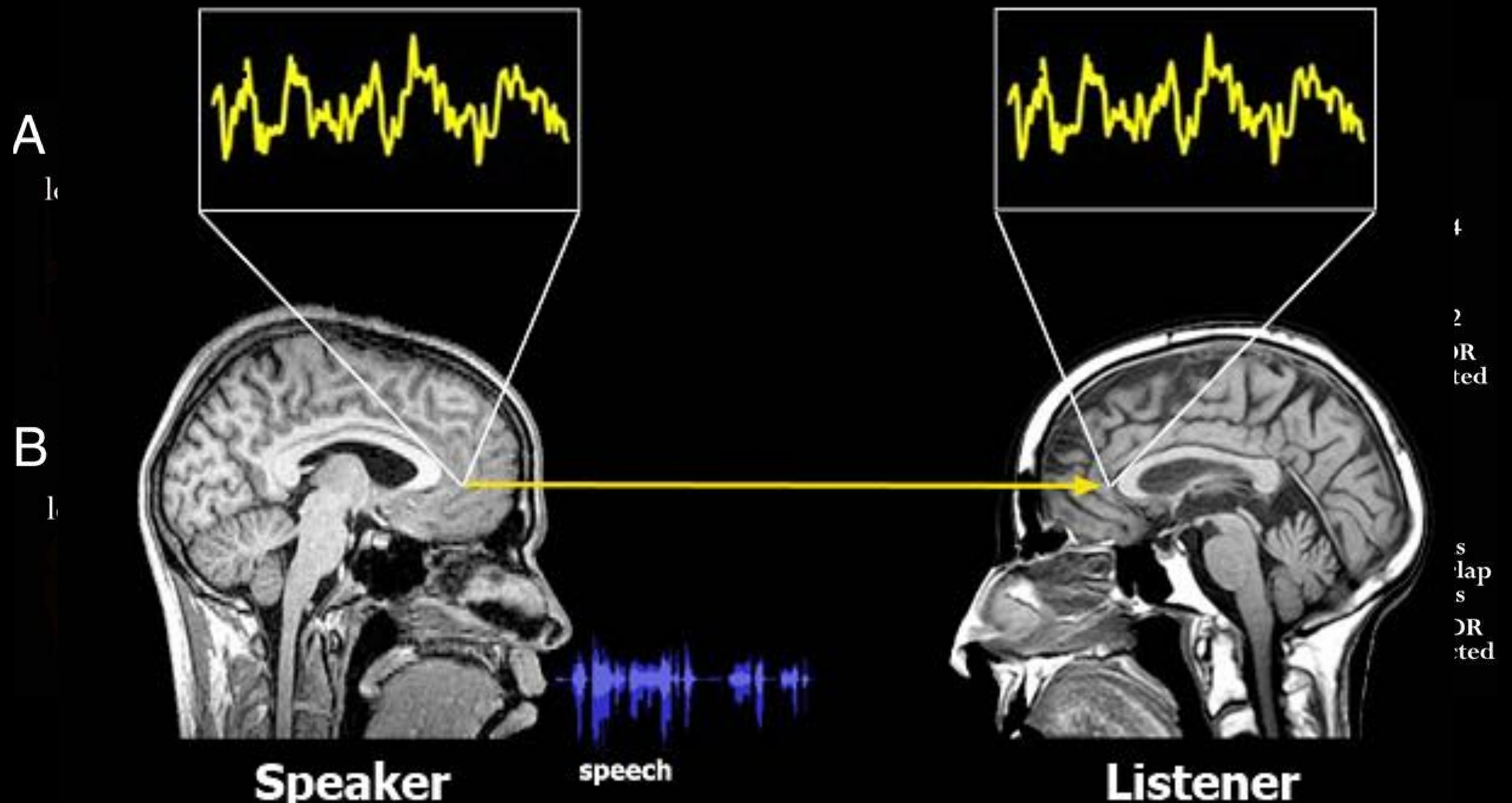
The New York Times Magazine

When the Revolution Came for Amy Cuddy

As a young social psychologist, she played by the rules and won big: an influential study, a viral TED talk, a prestigious job at Harvard. Then, suddenly, the rules changed.

BY SUSAN DOMINUS OCT. 18, 2017

Speaker-Listener Neural Coupling



1) Stephens et al. (2010) Speaker–listener neural coupling underlies successful communication. PNAS 107(32): 14425-14430

2) Hasson et al. (2012) Brain-to-brain coupling: a mechanism for creating and sharing a social world. Trends in Cognitive Science. 16(2):114-121

PLOS | ONE

RESEARCH ARTICLE

Interactions among Collective Spectators Facilitate Eyeblink Synchronization

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Citation: Nomura R, Liang Y, Okada T (2015) Interactions among Collective Spectators Facilitate Eyeblink Synchronization. PLoS ONE 10(10): e0140774. doi:10.1371/journal.pone.0140774

Editor: Jun Ma, Lanzhou University of Technology, CHINA

Received: July 23, 2015

Accepted: September 30, 2015

Published: October 19, 2015

Data Availability Statement: All relevant data are within the paper and its Supporting Information files.

Funding: Support was provided by the Japan Society for the Promotion of Science, Grant-in-Aid for Japan Society for the Promotion of Science Fellows #2408089 to RN [https://kaken.nii.ac.jp/d/p/12J08089.en.html] and the Japan Society for the Promotion of Science, Grant-in-Aid for Scientific Research(A) #24243062 to TO [https://kaken.nii.ac.jp/d/p/24243062.en.html]. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

PLOS ONE | DOI:10.1371/journal.pone.0140774

frontiers in Psychology

ORIGINAL RESEARCH
published: 20 April 2015
doi: 10.3389/fpsyg.2015.00447

Emotionally excited eyeblink-rate variability predicts an experience of transportation into the narrative world

Ryota Nomura[1], Kojun Hino[2], Makoto Shimazu[3], Yingzong Liang[4] and Takeshi Okada[1]*

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Collective spectator communications such as oral presentations, movies, and storytelling performances are ubiquitous in human culture. This study investigated the effects of past viewing experiences and differences in expressive performance on an audience's transportive experience into a created world of a storytelling performance. In the experiment, 60 participants (mean age = 34.12 years, *SD* = 13.18 years, range 18–63 years) were assigned to watch one of two videotaped performances that were played (1) in an orthodox way for frequent viewers and (2) in a modified way aimed at easier comprehension for first-time viewers. Eyeblink synchronization among participants was quantified by employing distance-based measurements of spike trains, D^{spike} and $D^{interval}$ (Victor and Purpura, 1997). The results indicated that even non-familiar participants' eyeblinks were synchronized as the story progressed and that the effect of the viewing experience on transportation was weak. Rather, the results of a multiple regression analysis demonstrated that the degrees of transportation could be predicted by a retrospectively reported humor experience and higher real-time variability (i.e., logarithmic transformed *SD*) of inter blink intervals during a performance viewing. The results are discussed from the viewpoint in which the extent of eyeblink synchronization and eyeblink-rate variability acts as an index of the inner experience of audience members.

Keywords: eyeblink-rate variability, eyeblink synchronization, transportation, viewing experience, Rakugo, expert

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Edited by:
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Specialty section:
This article was submitted to Cognitive Science, a section of the journal Frontiers in Psychology

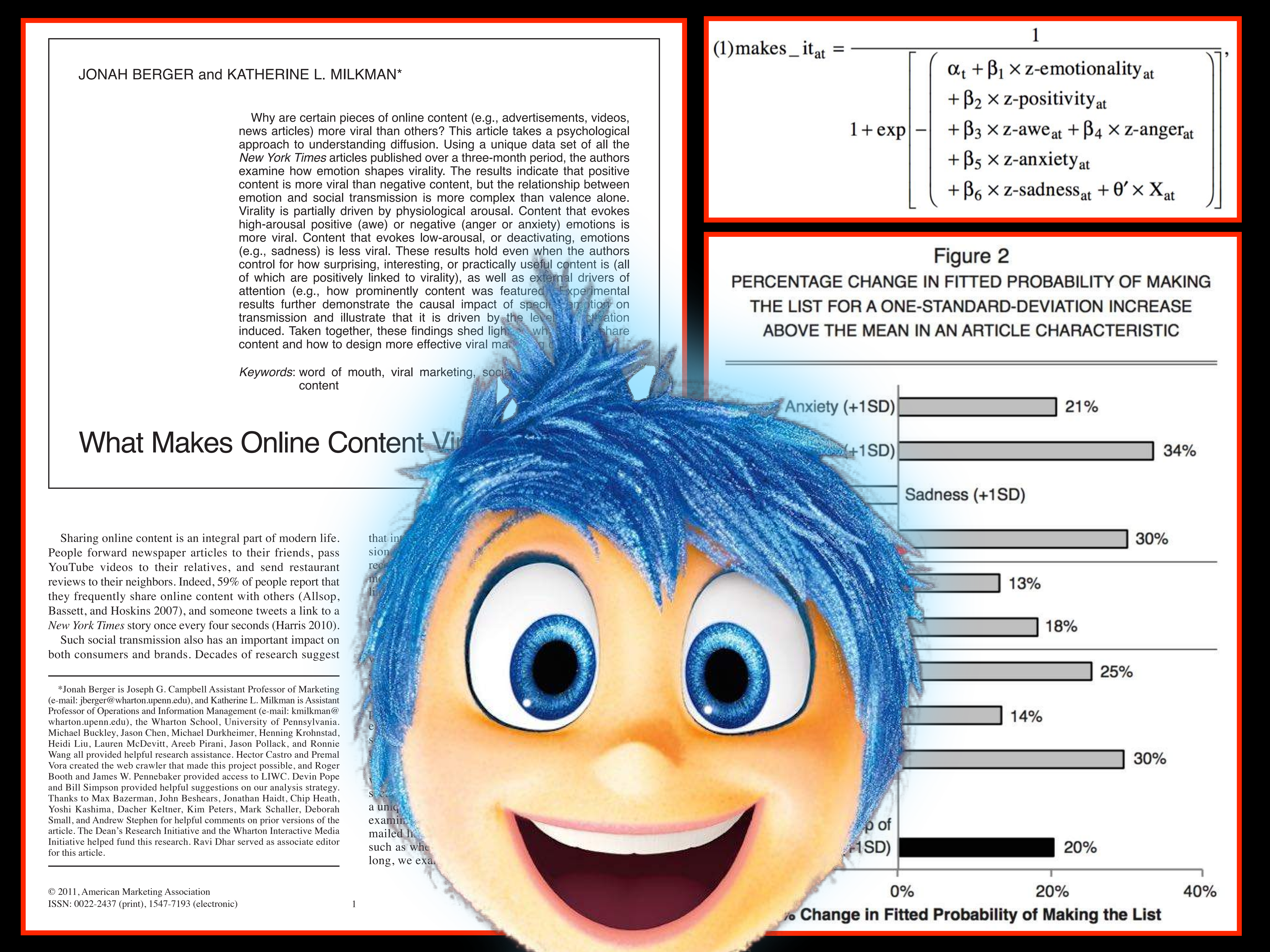
Received: *27 October 2014*
Accepted: *30 March 2015*
Published: *20 April 2015*

Citation:
Nomura R, Hino K, Shimazu M, Liang Y and Okada T (2015) Emotionally excited eyeblink-rate variability predicts an experience of transportation into the narrative world. Front. Psychol. 6:447. doi: 10.3389/fpsyg.2015.00447

Introduction

Collective spectator communications such as oral presentations, movies, and storytelling performances are ubiquitous in human culture. Spectators who share time and space frequently involve their minds and bodies in fascinating performances. Some spectators would describe their experience as being 'carried away' by the story. This engrossing temporal experience is known as "transportation into the narrative world" (Sestir and Green, 2010). In a previous study, researchers summarized facilitators of narrative transportation (Van Laer et al., 2014). For instance, Van Laer et al. (2014, p. 803) and pointed out that stories containing more identifiable characters to audience members, plotlines that storytelling audiences can imagine, and verisimilitude all increase the likelihood that a narrative transportation will occur. In addition, an audience

You will be shocked to learn that we do not own this image



JONAH BERGER and KATHERINE L. MILKMAN*

Why are certain pieces of online content (e.g., advertisements, videos, news articles) more viral than others? This article takes a psychological approach to understanding diffusion. Using a unique data set of all the *New York Times* articles published over a three-month period, the authors examine how emotion shapes virality. The results indicate that positive content is more viral than negative content, but the relationship between emotion and social transmission is more complex than valence alone. Virality is partially driven by physiological arousal. Content that evokes high-arousal positive (awe) or negative (anger or anxiety) emotions is more viral. Content that evokes low-arousal, or deactivating, emotions (e.g., sadness) is less viral. These results hold even when the authors control for how surprising, interesting, or practically useful content is (all of which are positively linked to virality), as well as external drivers of attention (e.g., how prominently content was featured). Experimental results further demonstrate the causal impact of speci... on transmission and illustrate that it is driven by the lev... induced. Taken together, these findings shed ligh... share content and how to design more effective viral ma...

Keywords: word of mouth, viral marketing, soci... content

What Makes Online Content Vi...

Sharing online content is an integral part of modern life. People forward newspaper articles to their friends, pass YouTube videos to their relatives, and send restaurant reviews to their neighbors. Indeed, 59% of people report that they frequently share online content with others (Allsop, Bassett, and Hoskins 2007), and someone tweets a link to a *New York Times* story once every four seconds (Harris 2010).

Such social transmission also has an important impact on both consumers and brands. Decades of research suggest

*Jonah Berger is Joseph G. Campbell Assistant Professor of Marketing (e-mail: jberger@wharton.upenn.edu), and Katherine L. Milkman is Assistant Professor of Operations and Information Management (e-mail: kmilkman@wharton.upenn.edu), the Wharton School, University of Pennsylvania. Michael Buckley, Jason Chen, Michael Durkheimer, Henning Krohnstad, Heidi Liu, Lauren McDevitt, Areeb Pirani, Jason Pollack, and Ronnie Wang all provided helpful research assistance. Hector Castro and Premal Vora created the web crawler that made this project possible, and Roger Booth and James W. Pennebaker provided access to LIWC. Devin Pope and Bill Simpson provided helpful suggestions on our analysis strategy. Thanks to Max Bazerman, John Beshears, Jonathan Haidt, Chip Heath, Yoshi Kashima, Dacher Keltner, Kim Peters, Mark Schaller, Deborah Small, and Andrew Stephen for helpful comments on prior versions of the article. The Dean's Research Initiative and the Wharton Interactive Media Initiative helped fund this research. Ravi Dhar served as associate editor for this article.

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ISSN: 0022-2437 (print), 1547-7193 (electronic) 1

$$(1)\, makes\_it_{at} = \frac{1}{1+\exp\left[-\left(\begin{array}{l}\alpha_t + \beta_1 \times \text{z-emotionality}_{at} \\ + \beta_2 \times \text{z-positivity}_{at} \\ + \beta_3 \times \text{z-awe}_{at} + \beta_4 \times \text{z-anger}_{at} \\ + \beta_5 \times \text{z-anxiety}_{at} \\ + \beta_6 \times \text{z-sadness}_{at} + \theta' \times X_{at}\end{array}\right)\right]},$$

Figure 2

PERCENTAGE CHANGE IN FITTED PROBABILITY OF MAKING THE LIST FOR A ONE-STANDARD-DEVIATION INCREASE ABOVE THE MEAN IN AN ARTICLE CHARACTERISTIC

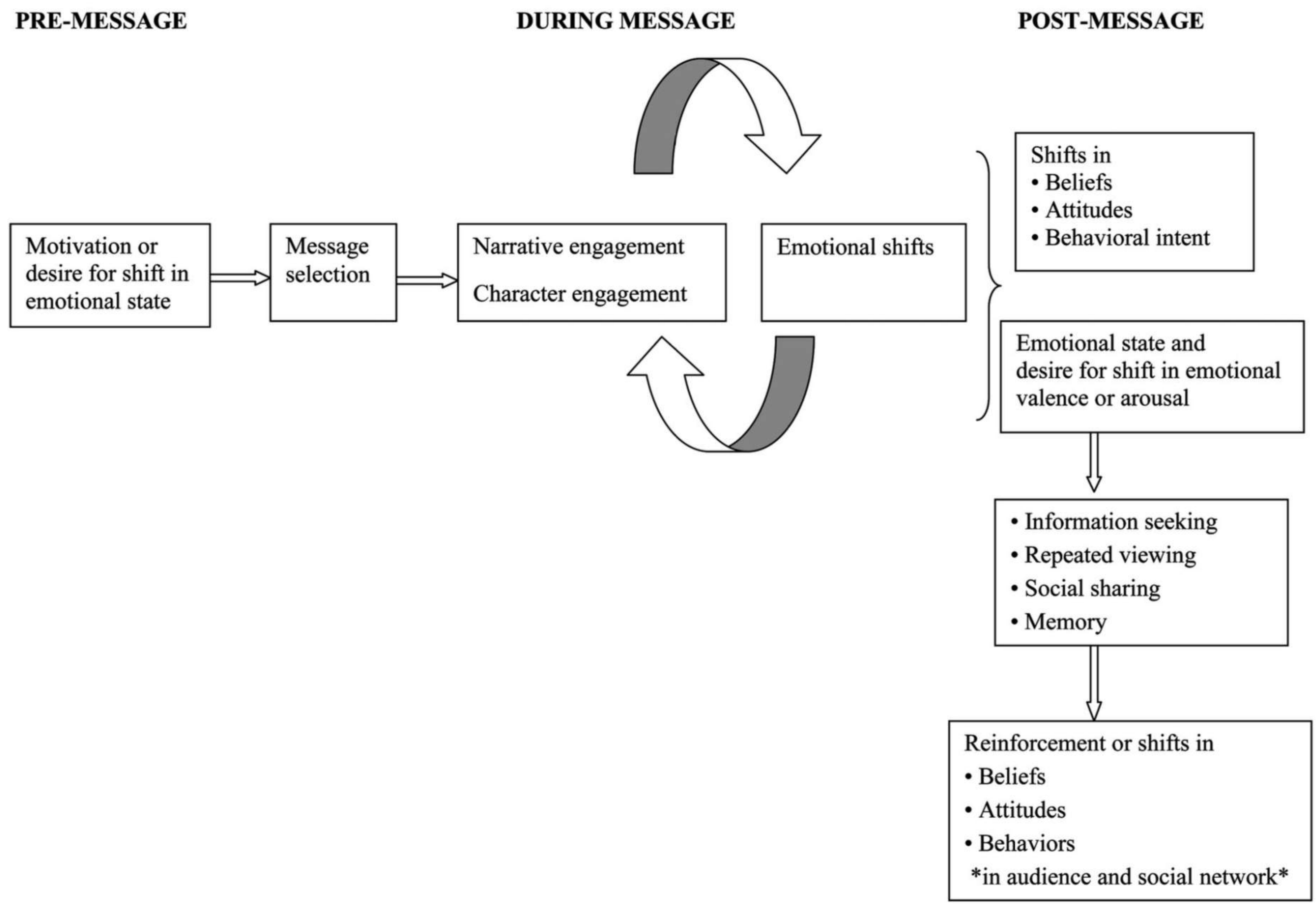

FIGURE 1 The role of emotional shifts in message selection, processing, and persuasive outcome.

PLOS | ONE

RESEARCH ARTICLE

Narrative Style Influences Citation Frequency in Climate Change Science

Ann Hillier, Ryan P. Kelly*, Terrie Klinger

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* rpkelly@uw.edu

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Abstract

Peer-reviewed publications focusing on climate change are growing exponentially with the consequence that the uptake and influence of individual papers varies greatly. Here, we derive metrics of narrativity from psychology and literary theory, and use these metrics to test the hypothesis that more narrative climate change writing is more likely to be influentia using citation frequency as a proxy for influence. From a sample of 732 scientific abstracts drawn from the climate change literature, we find that articles with more narrative abstracts are cited more often. This effect is closely associated with journal identity: higher-impact journals tend to feature more narrative articles, and these articles tend to be cited more often. These results suggest that writing in a more narrative style increases the uptake and influence of articles in climate literature, and perhaps in scientific literature more broadly.

OPEN ACCESS

Citation: Hillier A, Kelly RP, Klinger T (2016) Narrative Style Influences Citation Frequency in Climate Change Science. PLoS ONE 11(12): e0167983. doi:10.1371/journal.pone.0167983

Editor: Gary S. Bilotta, University of Brighton, UNITED KINGDOM

Received: September 7, 2016

Accepted: November 23, 2016

Published: December 15, 2016

Data Availability Statement: All relevant data are within the paper and its Supporting Information files.

Funding: The authors received no specific funding for this work.

Competing Interests: The authors have declared that no competing interests exist.

Introduction

Climate change is among the most compelling issues now confronting science and society, and climate science as a research endeavor has grown accordingly over the past decade. The number of scholarly publications is increasing exponentially, doubling every 5–6 years [1]. The volume of climate science publications now being produced far exceeds the ability of ind vidual investigators to read, remember, and use. Accordingly, it is increasingly important tha individual articles be presented in a way that facilitates the uptake of climate science and increases the salience of their individual research contributions.

Evidence from psychology and literary theory suggests that audiences better understand and remember narrative writing in comparison with expository writing [2,3], and new evidence from neuroscience has revealed a specific region in the brain that is activated by storie [4]. Narrative writing tells a story through related events [5], whereas expository writing relat facts without much social context. Presenting the same information in a more narrative way has the potential to increase its uptake—an especially attractive prospect in the context of climate science and scientific writing generally—and consequently, narratives are widely recognized as powerful tools of communication [2,6].

Despite this, professional scientific writing tends to be more expository than narrative, pri oritizing objective observations made by detached researchers and relying on the logical

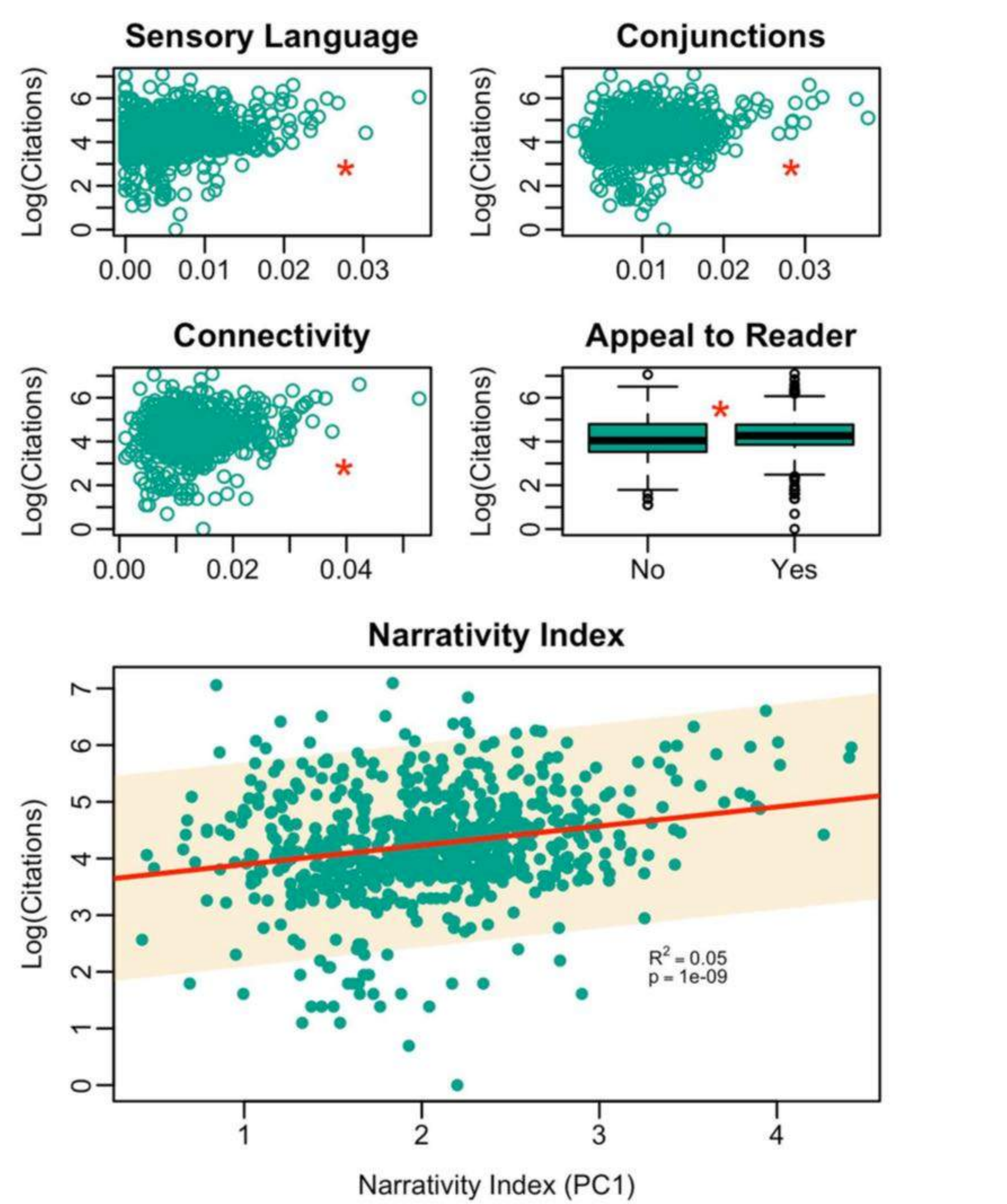


Fig 1. Multipanel plot depicting the relationship between narrativity (individual indicators and single narrativity index given by PC1, labeled individually) and article citation frequency. The use of sensory language, conjunctions, connectivity, and appeal to the reader are significantly correlated with article citation frequency. PC1 index of narrativity is significantly correlated with article citation frequency (linear regression; shaded area indicates 95% confidence interval for the linear model parameters).

what are stories?

characters

causality

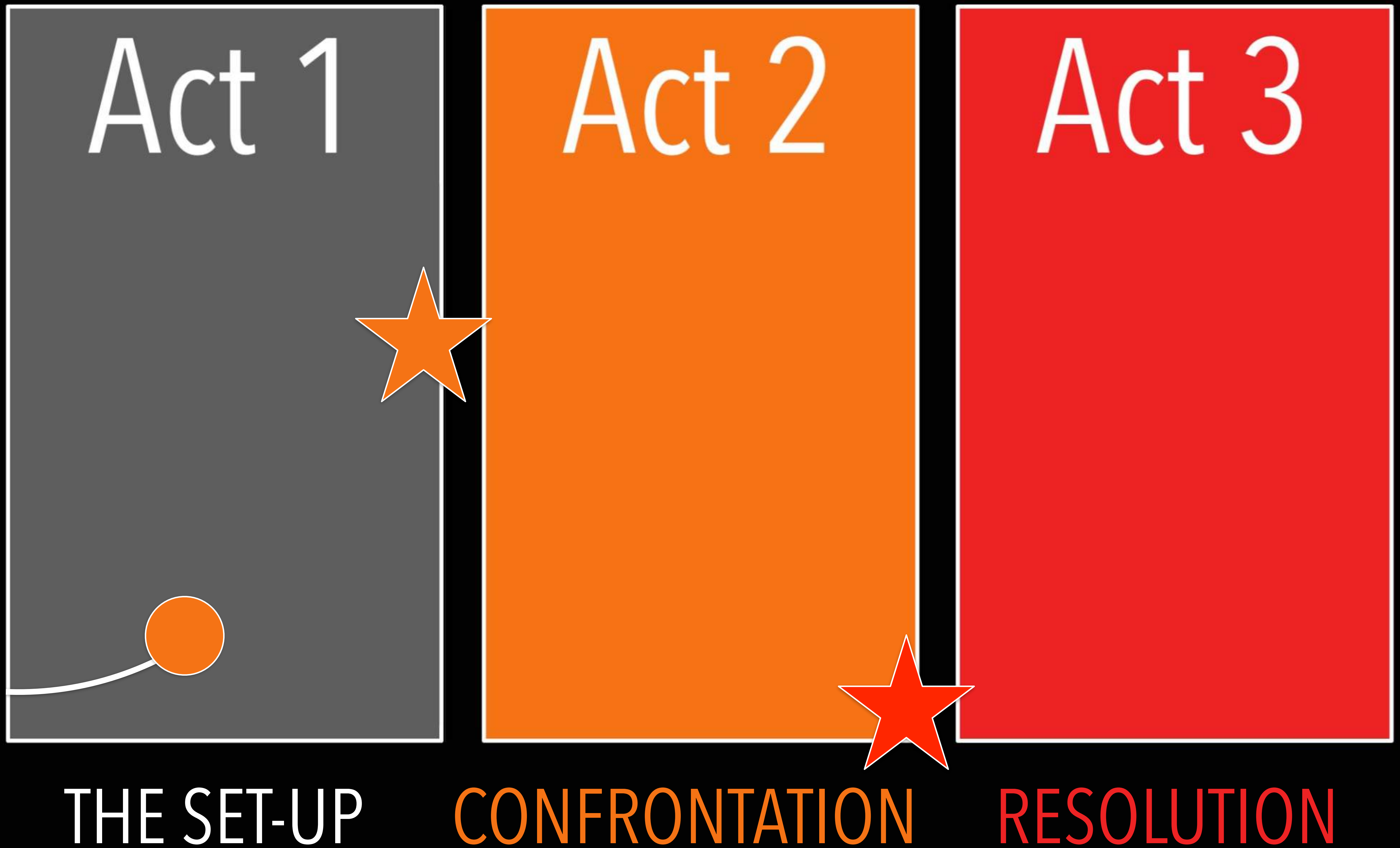
THE STORY SPINE

- Once upon a time… and every day…
- But, one day…
- Because of that…
- Because of that…
- Because of that…
- Until, finally…
- And, ever since then…

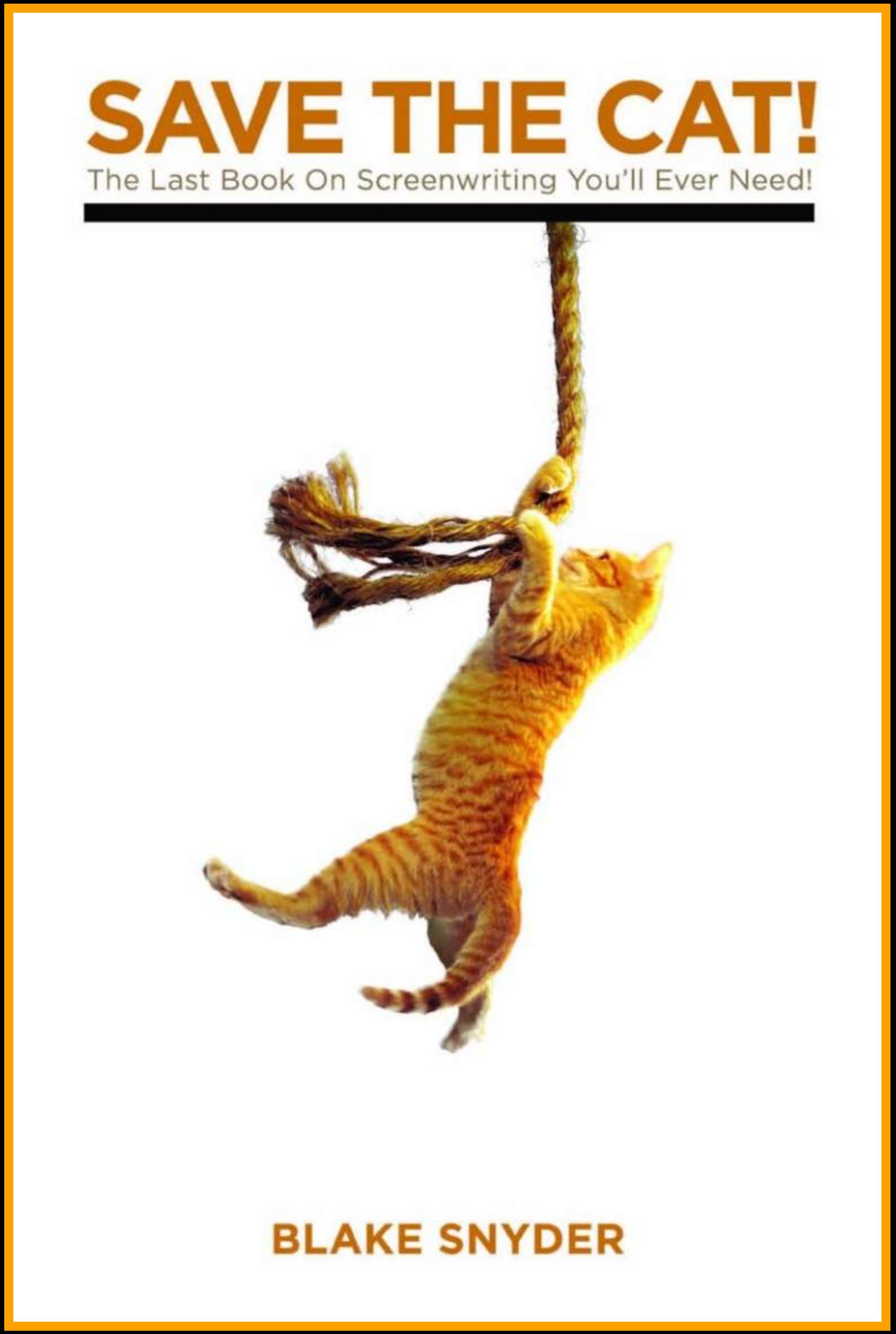
From Addams, *How to Improvise a Full-Length Play.*
(Don't be scared by the title, that's not what we're doing here.)

THE BLAKE SNYDER BEAT SHEET

1. Opening Image (1)
2. Theme Stated (5)
3. Set-Up (1-10)
4. Catalyst (12)
5. Debate (12-25)
6. Break into Two (25)
7. B Story (30)
8. Fun and Games (30-55)
9. Midpoint (55)
10. Bad Guys Close In (55-75)
11. All Is Lost (75)
12. Dark Night of the Soul (75-85)
13. Break into Three (85)
14. Finale (85-110)
15. Final Image (110)


Act 1
Act 2
Act 3
THE SET-UP
CONFRONTATION
RESOLUTION

THE BLAKE SNYDER BEAT SHEET



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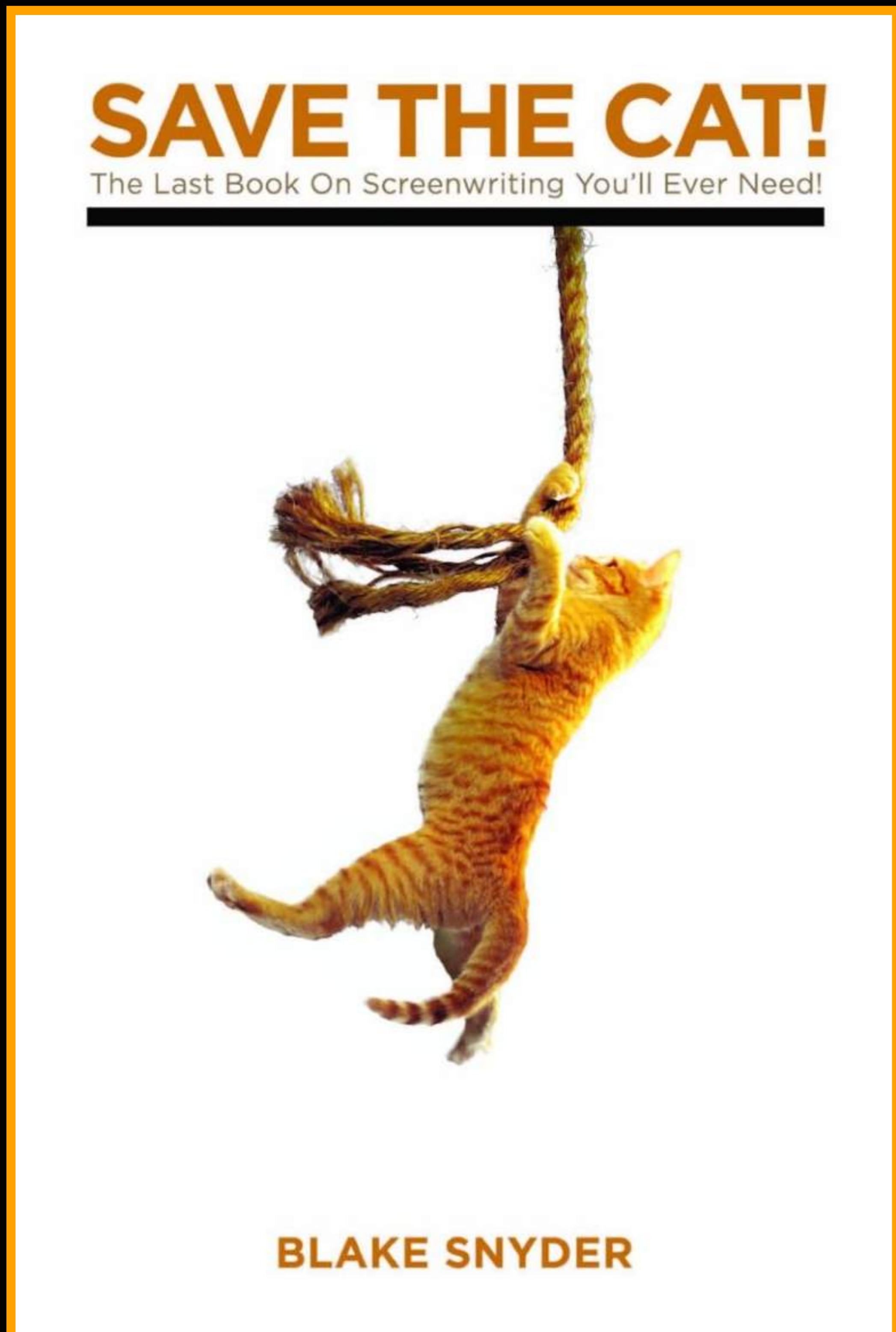
6. Break into Two (25)
7. B Story (30)
8. Fun and Games (30-55)
9. Midpoint (55)
10. Bad Guys Close In (55-75)
11. All Is Lost (75)
12. Dark Night of the Soul (75-85)
13. Break into Three (85)
14. Finale (85-110)
15. Final Image (110)

THE BLAKE SNYDER BEAT SHEET



1. Opening Image
2. Theme Stated
3. Set-Up

Catalyst

5. Debate

Break into Two

7. B Story
8. Fun and Games
9. Midpoint
10. Bad Guys Close In
11. All Is Lost
12. Dark Night of the Soul

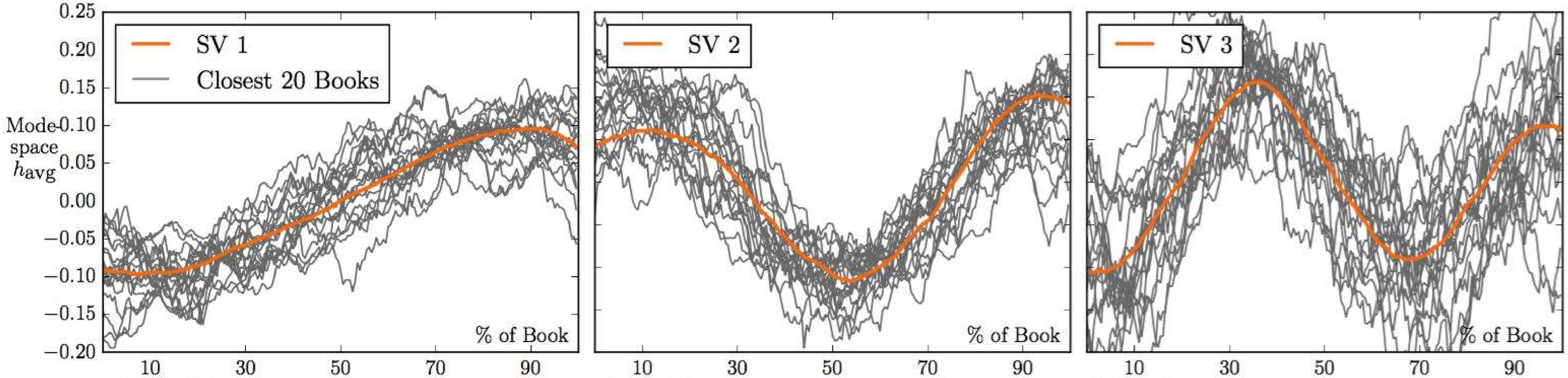
Break into Three

Finale

15. Final Image

GREAT FORTUNE

ILL FORTUNE



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http://hedonometer.org/books/v3/1539/
2: Oscar Wilde, Art and Morality: A... (33689, 88)
http://hedonometer.org/books/v3/33689/
3: The Terror: A Mystery (35617, 61)
http://hedonometer.org/books/v3/35617/
4: The Pilgrim's Progress in Words ... (7088, 55)
http://hedonometer.org/books/v3/7088/
5: The Road to Oz (26624, 68)
http://hedonometer.org/books/v3/26624/

Top Stories:

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2: Children of the Frost (10736, 82)
http://hedonometer.org/books/v3/10736/
3: Tamburlaine the Great — Part 1 (1094, 474)
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4: The Life and Adventures of Santa... (520, 76)
http://hedonometer.org/books/v3/520/
5: Justice (2911, 50)
http://hedonometer.org/books/v3/2911/

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2: Through the Magic Door (5317, 81)
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3: After London; Or, Wild England (13944, 146)
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4: The Shadow of the Rope (12590, 75)
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5: That Affair at Elizabeth (35247, 62)
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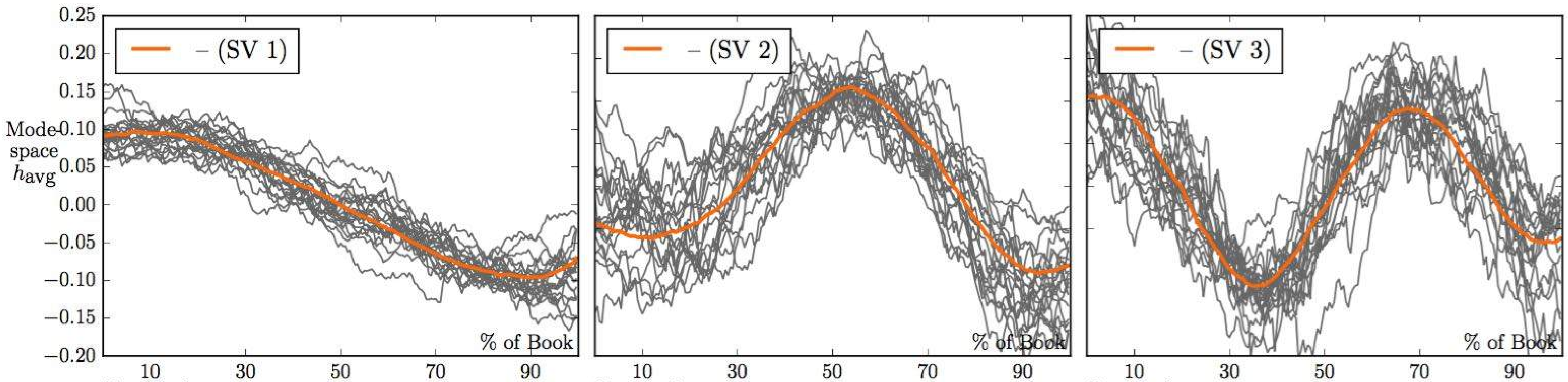

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3: The House of the Vampire (17144, 188)
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4: Tom Sawyer, Detective (93, 112)
http://hedonometer.org/books/v3/93/
5: The Island of Doctor Moreau (159, 1083)
http://hedonometer.org/books/v3/159/

Top Stories:

1: Shadowings (34215, 63)
http://hedonometer.org/books/v3/34215/
2: Battle-Pieces and Aspects of the... (12384, 194)
http://hedonometer.org/books/v3/12384/
3: The Slayer of Souls (36281, 63)
http://hedonometer.org/books/v3/36281/
4: The Bobbsey Twins : Or, Merry Day... (17412, 69)
http://hedonometer.org/books/v3/17412/
5: Allan's Wife (2727, 128)
http://hedonometer.org/books/v3/2727/

Top Stories:

1: This World Is Taboo (18172, 64)
http://hedonometer.org/books/v3/18172/
2: Old Indian Days (339, 139)
http://hedonometer.org/books/v3/339/
3: The Evil Guest (10377, 93)
http://hedonometer.org/books/v3/10377/
4: Pariah Planet (29448, 96)
http://hedonometer.org/books/v3/29448/
5: The Wind in the Willows (289, 1475)
http://hedonometer.org/books/v3/289/

Reagan et al arXiv


SV 1
Closest 20 Books
Mode space h_{avg}
% of Book
Top Stories:
1: The Winter's Tale (1539, 73)
"Rags to Riches"
3: The Terror: A Mystery (35617, 61)
http://hedonometer.org/books/v3/35617/
4: The Pilgrim's Progress in Words ... (7088, 55)
http://hedonometer.org/books/v3/7088/
5: The Road to Oz (26624, 68)
http://hedonometer.org/books/v3/26624/
SV 2
% of Book
Top Stories:
1: The Magic of Oz (419, 186)
"Man in Hole"
3: Tamburlaine the Great — Part 1 (1094, 474)
http://hedonometer.org/books/v3/1094/
4: The Life and Adventures of Santa... (520, 76)
http://hedonometer.org/books/v3/520/
5: Justice (2911, 50)
http://hedonometer.org/books/v3/2911/
SV 3
% of Book
Top Stories:
1: The Mystery of the Hasty Arrow (17763, 93)
"Cinderella"
3: After London; Or, Wild England (13944, 146)
http://hedonometer.org/books/v3/13944/
4: The Shadow of the Rope (12590, 75)
http://hedonometer.org/books/v3/12590/
5: That Affair at Elizabeth (35247, 62)
http://hedonometer.org/books/v3/35247/
– (SV 1)
Mode space h_{avg}
% of Book
Top Stories:
1: Lady Susan (946, 894)
http://hedonometer.org/books/v3/946/
"Tragedy"
4: Tom Sawyer, Detective (93, 112)
http://hedonometer.org/books/v3/93/
5: The Island of Doctor Moreau (159, 1083)
http://hedonometer.org/books/v3/159/
– (SV 2)
% of Book
Top Stories:
1: Shadowings (34215, 63)
http://hedonometer.org/books/v3/34215/
"Icarus"
3: The Slayer of Souls
http://hedonometer.org/books/v3/36281/
4: The Bobbsey Twins : Or, Merry Day... (17412, 69)
http://hedonometer.org/books/v3/17412/
5: Allan's Wife (2727, 128)
http://hedonometer.org/books/v3/2727/
– (SV 3)
% of Book
Top Stories:
1: This World Is Taboo (18172, 64)
http://hedonometer.org/books/v3/18172/
"Oedipus"
http://hedonometer.org/books/v3/10377/
4: Pariah Planet (29448, 96)
http://hedonometer.org/books/v3/29448/
5: The Wind in the Willows (289, 1475)
http://hedonometer.org/books/v3/289/

80% of what you need to know about story structure in one slide

BEGINNING ········ MIDDLE ········ END

SOMETHING CHANGES

why stories?

give voice to experience
bear witness to suffering
construct identity
connect knowledge to action

#metoo

what is normal?



http://ed.fnal.gov/projects/scientists - drawings L to R by Amy, Andrea, and Beth

  

http://ed.fnal.gov/projects/scientists - drawings L to R by Amy, Andrea, and Beth

Scientist Spotlight Homework Assignments Shift Students' Stereotypes of Scientists and Enhance Science Identity in a Diverse Introductory Science Class

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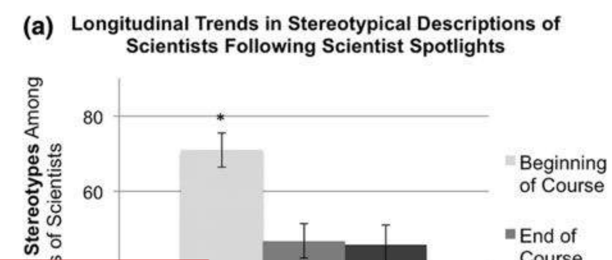
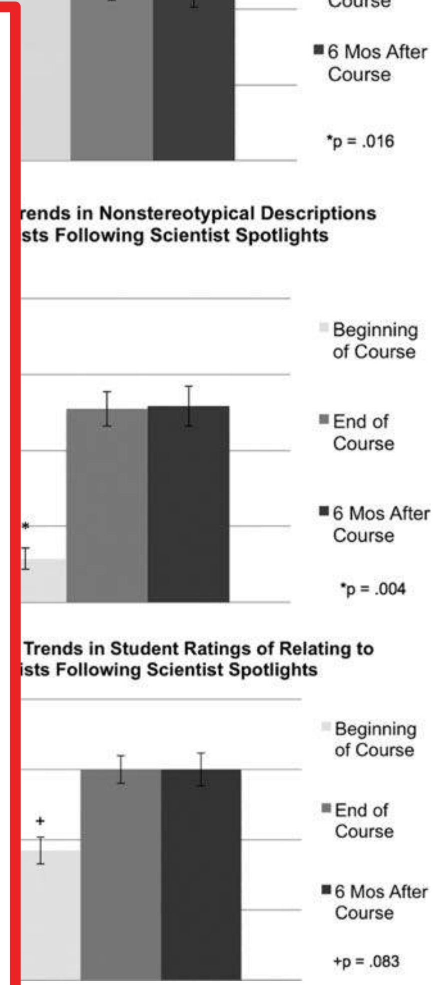
ABSTRACT

Research into science identity, stereotype threat, and possible selves suggests a lack of diverse representations of scientists could impede traditionally underserved students from persisting and succeeding in science. We evaluated a series of metacognitive homework assignments ("Scientist Spotlights") that featured counterstereotypical examples of scientists in an introductory biology class at a diverse community college. Scientist Spotlights additionally served as tools for content coverage, as scientists were selected to match topics covered each week. We analyzed beginning- and end-of-course essays completed by students during each of five courses with Scientist Spotlights and two courses with equivalent homework assignments that lacked connections to the stories of diverse scientists. Students completing Scientist Spotlights shifted toward counterstereotypical descriptions of scientists and conveyed an enhanced ability to personally relate to scientists following the intervention. Longitudinal data suggested these shifts were maintained 6 months after the completion of the course. Analyses further uncovered correlations between these shifts, interest in science, and course grades. As Scientist Spotlights require very little class time and complement existing curricula, they represent a promising tool for enhancing science identity, shifting stereotypes, and connecting content to issues of equity and diversity in a broad range of STEM classrooms.





ercent of *Stereotypes* (a), percent of
nd relatability Likert-scale selections (c) in
idents' responses at the beginning of the
urse, and 6 months following the end of the
resent SE.

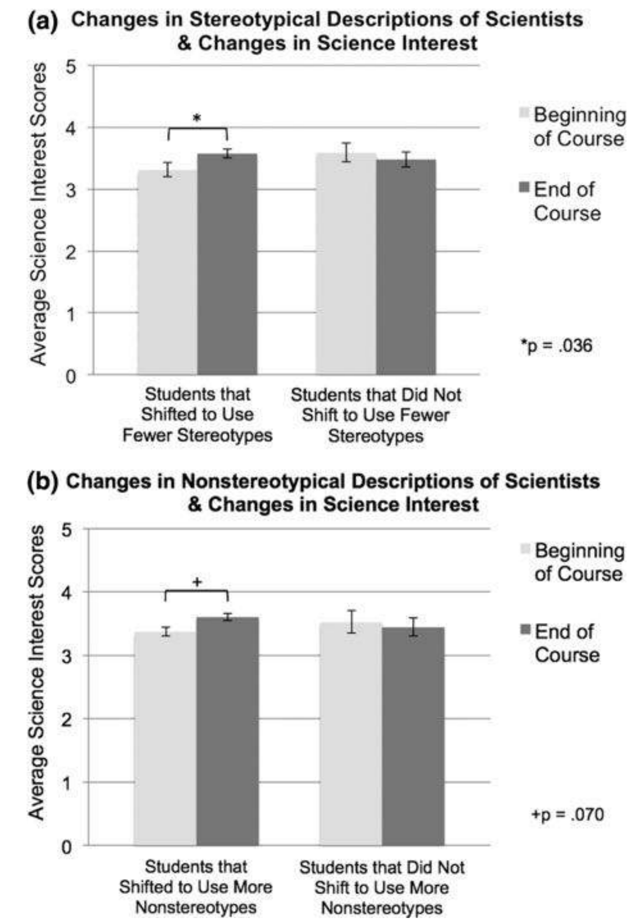


FIGURE 4. Relationships between changes in *Stereotypes* (a) and *Nonstereotypes* (b) to changes in Science Interest from the beginning of the course to the end of the course.

t may influence the effectiveness of Scien-
our anticipated future directions in explor-
hts.

s Generated Shifts in Students'
entists and Scientist Relatability

ypes prompt to evaluate the impact of Sci-
students' stereotypes of scientists. When

compared with a class performing a similar activity that lacked connections with diverse scientists, students who completed Scientist Spotlights adopted more nonstereotypical views of scientists (Figure 1). These changes appeared to be sustained 6 months after the courses ended (Figure 3) and were associated with higher course grades (Figure 5). Reductions in stereotypical descriptions of scientists further correlated with increases in Science Interest (Figure 4a) and an enhanced interest in STEM majors.

We piloted the relatability prompt as a tool for examining students' possible selves in a science context, making the case that explicitly asking students about their ability to personally relate to scientists would draw out descriptions of students' possible selves in relation to scientists. While only 43% of Course Reader Homework students found scientists relatable at the end of the course, the vast majority (79%) of Scientist Spotlight students did (Figures 2 and 4c). These students discussed shared personalities and interests outside science as reasons for being able to relate to scientists, with some students also commenting on certain scientists' nontraditional paths to gaining an interest in science. Many students used specific language such

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competence + goodwill + trustworthiness

products

AND

processes