



# THE LANDSCAPE OF MISINFORMATION (& DISINFORMATION) ABOUT SCIENCE

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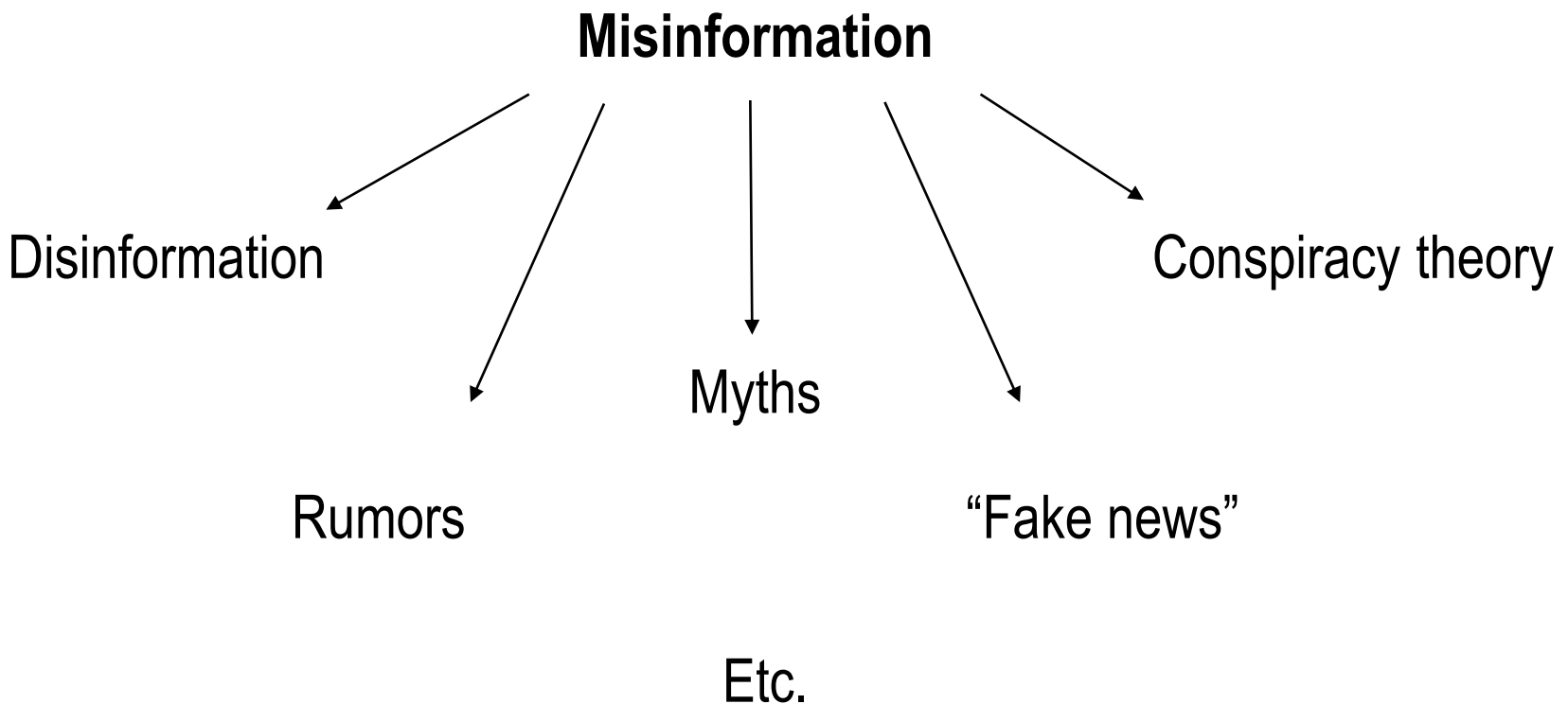
# AN OVERVIEW OF THIS TALK

- Defining Misinformation (and related terms)
- Theoretical Approaches & Guiding Concepts
- Methodological Approaches
- Notable Findings & Advice



# WHAT DO WE MEAN BY “MISINFORMATION”?

- Misinformation is the most common term in the literature





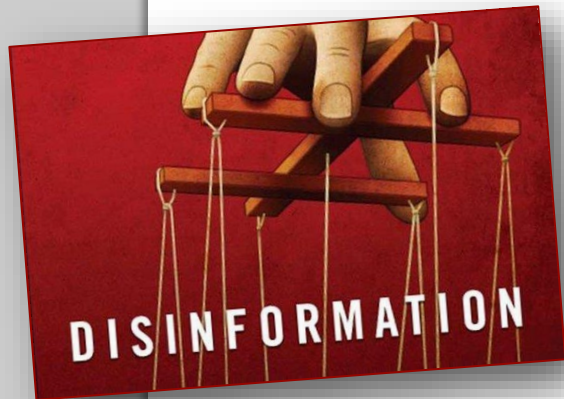
# DEFINING MISINFORMATION

Dictionary.com  
Word of the Year  
"Misinformation"

- Broadly defined as information that is in some way “inadequate,” “incomplete,” “misleading,” “distorted,” “confusing,” etc.
- False or inaccurate information that is spread **without intention to deceive**



# MISINFORMATION VS. RELATED TERMS



- **Disinformation:** “outright false information that is disseminated for propagandistic purposes ...” (Lewandowsky et al., 2013, p. 488)

- **Ignorance:** When one is ill-informed, but realizes they are

- As compared to a misinformed individual who is confident in their (incorrect) understanding

- **Misperceptions:** False beliefs that are not supported by the best available evidence





# AN OVERVIEW OF THIS TALK

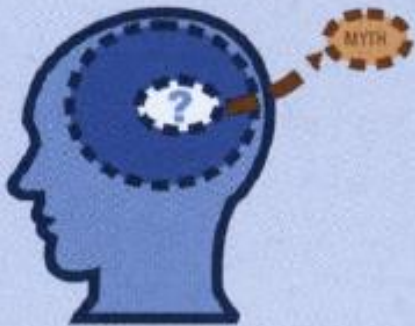
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# THE CONTINUED INFLUENCE EFFECT (CIE)

## Continued Influence Effect

Despite a retraction, people continue to rely on misinformation



- The CIE refers to the tendency for information that is revealed to be false, to continue to impact memory and reasoning
  - Lewandowsky, Ecker, Swire, Cook, etc.
  - Goal: understand the conditions under which the CIE holds or goes away



# OFFERED EXPLANATIONS FOR THE CIE

- Reluctance to dismiss information from memory unless a viable alternative is presented to replace it
- We increase the strength of the misinformation by repeating it during the retraction process
- Reactance effects where people rebel against a retraction because it tells them how to think





# MOTIVATED REASONING

- The biased selection and processing of content (partisan issues)
- Operates via several routes, including:
  - **Confirmation bias:** when given the freedom to choose, we select attitudinally consistent content
  - **Prior attitude effect:** we evaluate supportive arguments as stronger and more compelling than opposing arguments
  - **Disconfirmation bias:** we devote more time and cognitive resources toward attacking arguments that are incongruent with our thinking



# OTHER GUIDING FRAMEWORKS



- **Echo chambers:** reinforcement of opinions by polarized groups of like-minded people
- **Filter bubbles:** algorithms, which are based on our prior information choices and preferences control the content we encounter
- **Worldviews:** our values and orientations play a role in the processing of content
- **Skepticism:** the degree to which we question or scrutinize information from different sources

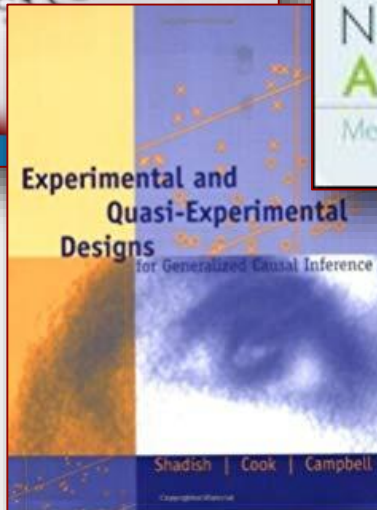


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- **Methodological Approaches**
- Notable Findings & Advice



# FOUR MAJOR METHODOLOGICAL APPROACHES



- Content analyses
- Network analyses/algorithm development
- Public opinion work (surveys, focus groups, interviews)
- Experiments



# CONTENT ANALYSES: DIAGNOSING THE SCOPE OF THE PROBLEM



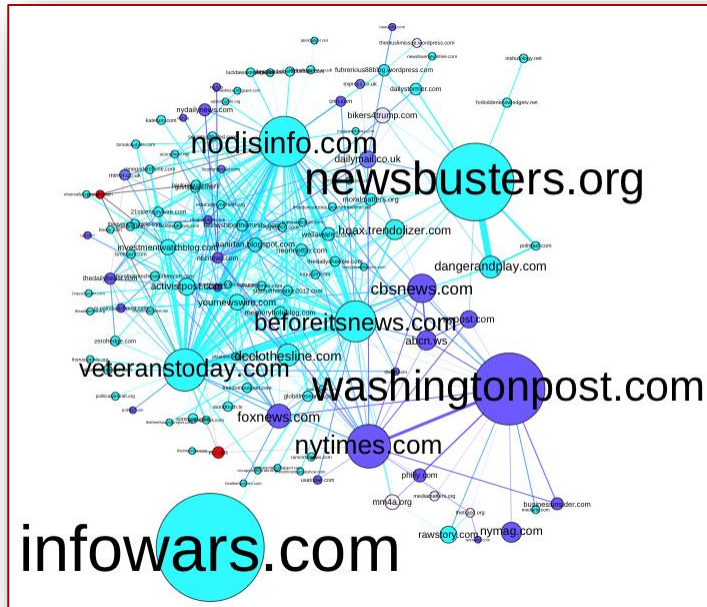
- Major emphasis on health, whether a highly specific topic (e.g., fluoridation) or broader in scope (e.g., general health)



- Focus is on online sources, ranging from search engine results to sets of websites to specific social media platforms



# NETWORK ANALYSES/ALGORITHM DEVELOPMENT: UNDERSTANDING MISINFORMATION SPREAD



- First, identifying the common features of false content as compared to accurate content
  - Linguistic style of rumors and common features of (dis/mis)information

# NETWORK ANALYSES/ALGORITHM DEVELOPMENT: LEARNING TO STIFLE THAT SPREAD



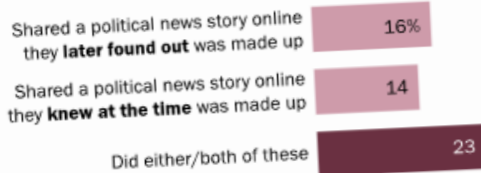
- Next, understanding content flow
  - What do online communities look like?
  - What features of (dis/mis)information are correlated with engagement?
  - How quickly does such content spread?
  - Can we use the network to inoculate people prior to misinformation exposure?



# PUBLIC OPINION WORK: GETTING AT THE NUANCE OF THE PROBLEM

## About one in four report sharing fabricated news - whether aware at the time or not

*% of U.S. adults who say they ...*



Source: Survey conducted Dec. 1-4, 2016.  
"Many Americans Believe Fake News Is Sowing Confusion"

PEW RESEARCH CENTER

- Expert and lay studies focus on:
  - Perceptions of how widespread the problem is in different communities
  - Where people search for information and how they identify the quality of sources
  - Those who are most vulnerable
  - What are the feasible solutions to combat public (dis/mis)information?





# EXPERIMENTAL WORK: CORRECTING MISINFORMATION IN THE MIND



- Retraction and correction studies
- “Backfire effect” work
  - When a claim reinforces someone’s beliefs, “debunking” it can actually strengthen that belief
- Real-world intervention where politicians are (or are not) reminded of fact-checking services to test impacts on later communications



# AN OVERVIEW OF THIS TALK

- Defining Misinformation (and related terms)
- Theoretical Approaches & Guiding Concepts
- Methodological Approaches
- **Notable Findings & Advice**



# HOW BIG IS THE PROBLEM? IT DEPENDS HOW YOU LOOK AT IT

- Different approaches employed on the same or similar topics yield consistent conclusions
  - e.g., Major concerns about the quality of health content through search engine results
- Other times, explorations of the same content in the same medium differ dramatically
  - Depending on search terms employed, Ebola coverage on Twitter is either highly flawed or consists of a small body of rumors that make up a tiny fraction of overall coverage



# WORK IN THE POLITICAL SPACE CAN BE HELPFUL FOR UNDERSTANDING THE SIZE OF THE PROBLEM

## 2016 Election

- Combined survey responses with web traffic histories
- One-quarter of Americans visited a “fake news” website
- Evidence that Facebook helped spread fake news
- Fake news consumption was most concentrated among the most extreme conservatives

## 2018 Midterms

- Combined survey responses with web traffic histories
- Less than 10% of Americans visited a “fake news” website
- Distinct Facebook patterns no longer present in 2018
- Fake news consumption was most concentrated among the most extreme conservatives



# THERE'S AT LEAST SOME PROBLEM, SO, WHAT CAN WE DO ABOUT IT?

- Automated models for the identification and control of false content are being built and tested in computer science and related fields
- Models based on the linguistic style of misinformation, the people who share misinformation, network characteristics, and engagement patterns have all been tested
- While many show promise, most have not moved beyond the testing phase ...



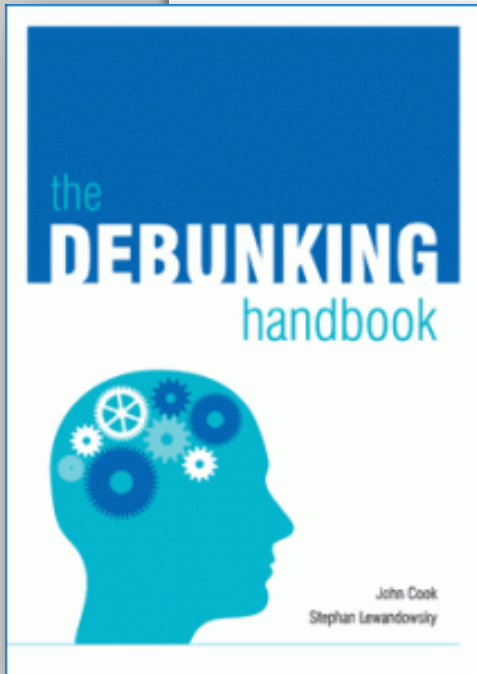
# IDENTIFYING & CONTROLLING MISINFORMATION: THE PRACTICAL WORK BEING DONE

## OSoMe

- One exception to this is the “Observatory on Social Media” (OSoMe) at Indiana University
  - Collaboration among computer scientists, journalists, political scientists, sociologists, etc.
  - Development of several tools for identifying bots and misinformation and understanding the spread of (false) online content
  - “First group to uncover evidence of systematic, orchestrated, and widely spread misinformation campaigns based on ‘astroturf’ (fake grassroots movements) and social bots”



# WHAT DO WE DO ONCE PEOPLE ARE “INFECTED”? COMBATting MISINFORMATION IN PEOPLE



- The CIE is the most investigated phenomenon
  - Few studies have completely eliminated misinformation influence
- The most promising work dealing with the CIE has focused on:
  - Delivering warnings at the time of message exposure, including forms of media literacy training
  - Strengthening retractions through repetition
  - Providing corrections that offer an alternative narrative



# WHAT DO WE DO ONCE PEOPLE ARE “INFECTED”? COMBATting MISINFORMATION IN PEOPLE

- Other trends and results worth highlighting:
  - Sources matter, with some evidence that unlikely sources and authoritative sources (e.g., CDC) work better than expected sources and regular users
  - Referencing your arguments adds credibility to your correction or “debunking”
  - Mixed evidence on fact-checking, with recent work suggesting it works in certain contexts, and other work demonstrating the “backfire effect”





# ADDITIONAL ADVICE FOR CORRECTING MISPERCEPTIONS

- Suggestions for practitioners (Lewandowsky et al., 2012)

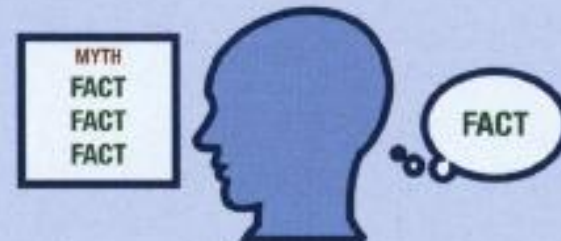
## Emphasis on Facts

Avoid repetition of the myth; reinforce the correct facts instead



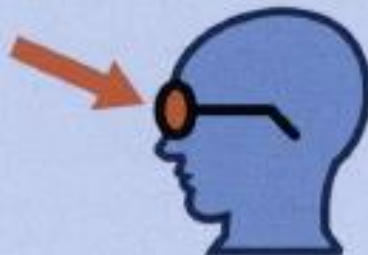
## Simple, Brief Rebuttal

Use fewer arguments in refuting the myth — less is more



## Affirm Worldview

Frame evidence in worldview-affirming manner by endorsing values of audience



## Affirm Identity

Self-affirmation of personal values increases receptivity to evidence





THANK YOU

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