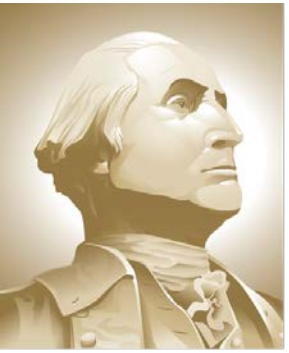

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Communication Strategies for Behavior Change on Social Media

Communication Strategies for Behavior Change on Social Media

Summit on Social and Behavioral Science for National Security

Decision Sciences and Risk

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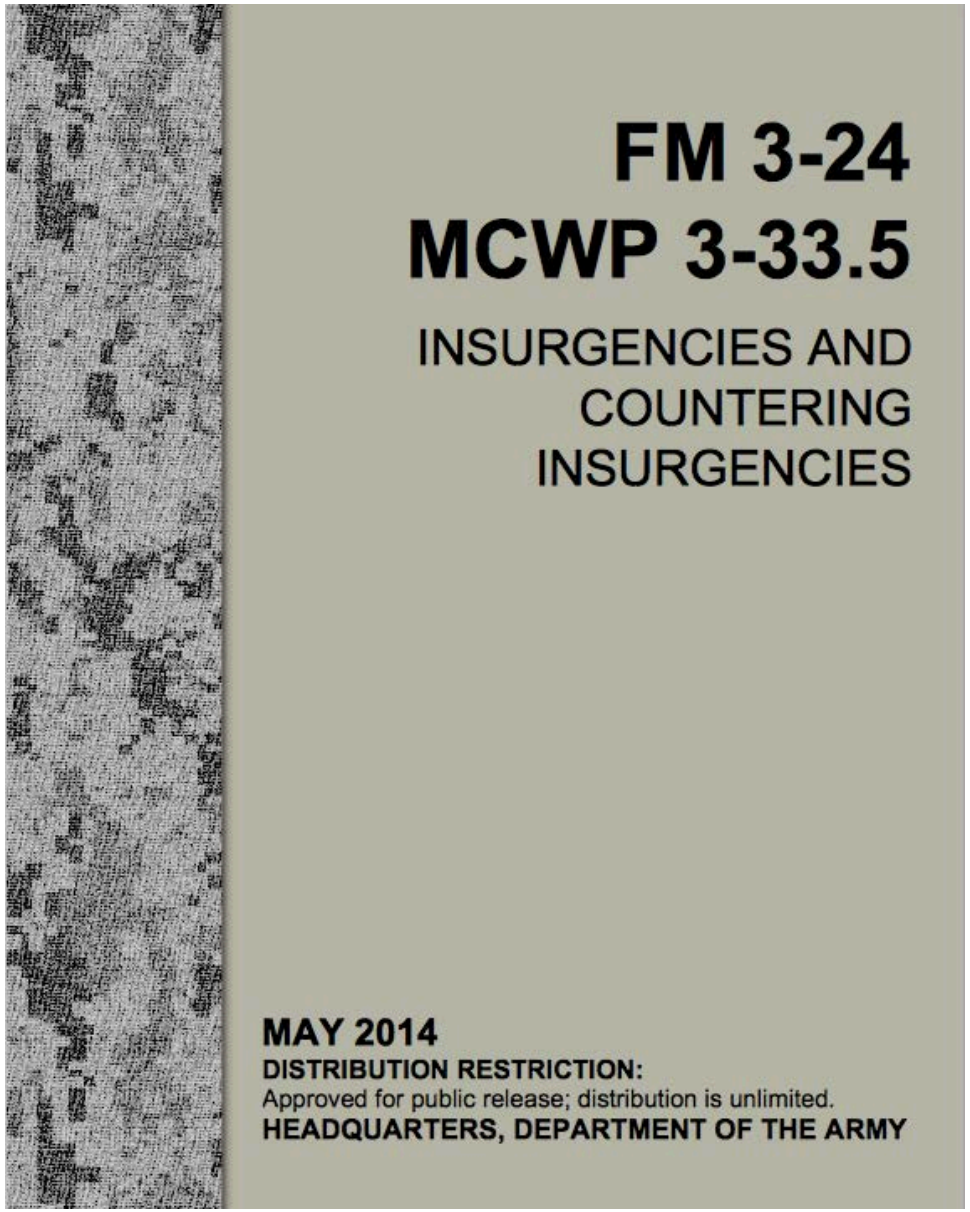
Joint work with Mark Dredze, Johns Hopkins University, Karen M. Hilyard, and Sandra C. Quinn, University of Maryland

Agenda

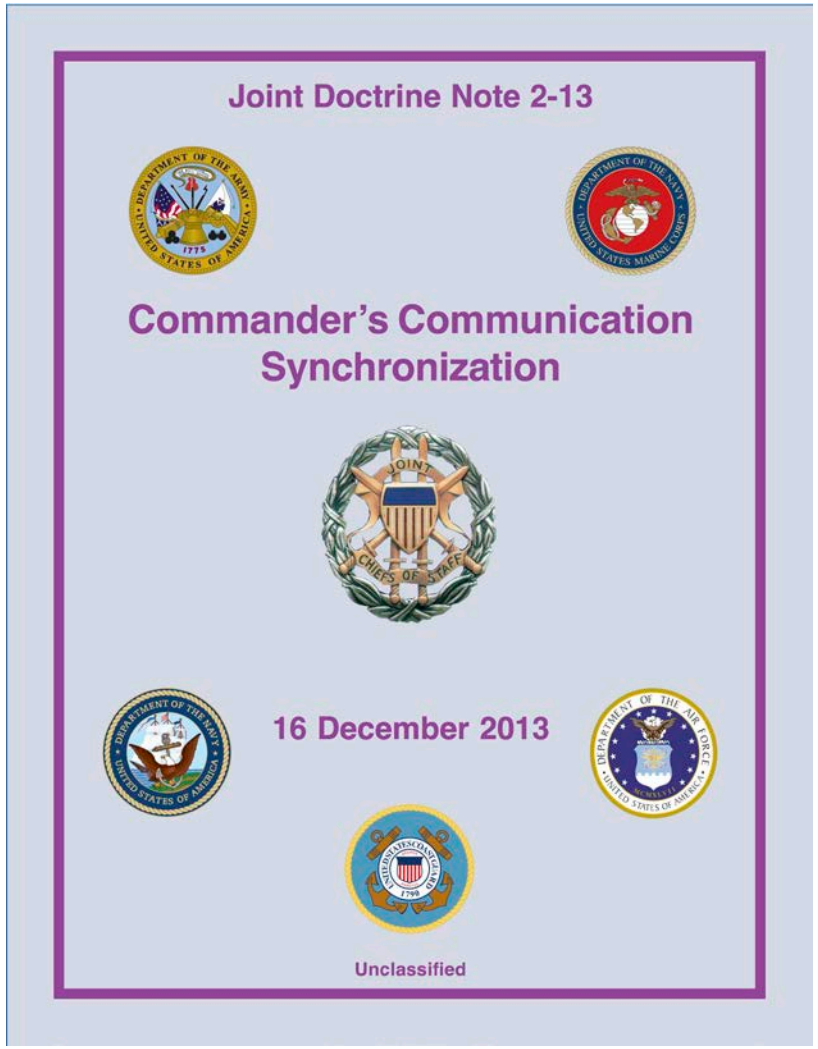
- ”The Battle of the Narrative”
  - Similar problems faced by national security and public health practitioners
  - The case of the Zika virus
- Effective Communication on Social Media: Statistics, stories, or gist in the Disneyland measles outbreak?
  - Fuzzy Trace Theory
- Future Directions: Synergies between survey methods and social media



Narratives and National Security

- U.S. Military doctrine emphasizes the importance of targeted and tailored communications
- FM 3-24 ”Insurgencies and Countering Insurgencies”
  - ”The root causes of an insurgency are real or perceived grievances that insurgents use to mobilize a population in support of an insurgency…As conditions change, **insurgent leaders create different narratives to mobilize a population.**” (p. 4-3)

The ”Battle of the Narrative”



- JDN 2-13: ”For enduring interventions, there can be a continuing struggle to define the national and international debate/discussion on terms favorable to one side, causing a clash between the competing narratives of the actors involved. This is often what is referred to as the “battle of the narrative.” **A key component of the narrative is establishing the reasons for and desired outcomes of the conflict, in terms understandable to relevant publics.**” pp. ix-x
- ”**Social media enables** the rapid transmission of **information and misinformation** to domestic and international publics and communities of interest” p II-13

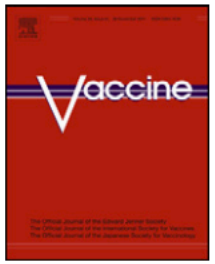
Narratives and Vaccine Refusal

Vaccine 30 (2012) 3727–3733

Contents lists available at SciVerse ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine



Opportunities and challenges of Web 2.0 for vaccination decisions☆

Cornelia Betsch[a,*], Noel T. Brewer[b], Pauline Brocard[c], Patrick Davies[d], Wolfgang Gaissmaier[e], Niels Haase[a], Julie Leask[f], Frank Renkewitz[a], Britta Renner[g], Valerie F. Reyna[h], Constanze Rossmann[i], Katharina Sachse[j], Alexander Schachinger[k], Michael Siegrist[l], Marybelle Stryk[m]

- Narratives have inherent advantages over other communication formats…[and] include all of the key elements of memorable messages: They are easy to understand, concrete, credible … and highly emotional. These qualities make this type of information compelling…" (p. 3730)

Role of social media in vaccination narratives

- 80% of Internet users seek health information online (Kata, 2012)
- 16% seek vaccination information online (Kata, 2012)
- Social media is a hotbed of anti-vaccination activity (entire special issue, *Vaccine*, 2012)
- More people now get their news from social media (Pew Center, 2015)
  - 30% of the U.S. population gets news from Facebook
  - 61% of millennials get the *majority* of their news from social media
- 71% of all online U.S. adults are on Facebook (Pew Center, 2014)
- Facebook posts represent 81% of all article shares (Becker, 2015)

Broniatowski, D. A., Hilyard, K. M., & Dredze, M. (2016). Effective vaccine communication during the Disneyland measles outbreak. *Vaccine*. http://doi.org/10.1016/j.vaccine.2016.04.044

Organized Anti-Vaxx Campaigns

- As in national security contexts, anti-vaccination social media campaigns are generally well-organized and manipulate facts to fit an existing narrative
- ”REPORT from Physicians in the Crop-Sprayed Villages regarding Dengue-Zika, microcephaly, and mass-spraying with chemical poisons”
  - http://www.reduas.com.ar/wp-content/uploads/downloads/2016/02/Informe-Zika-de-Reduas_TRAD.pdf

Monsanto does not make or use pyriproxifen

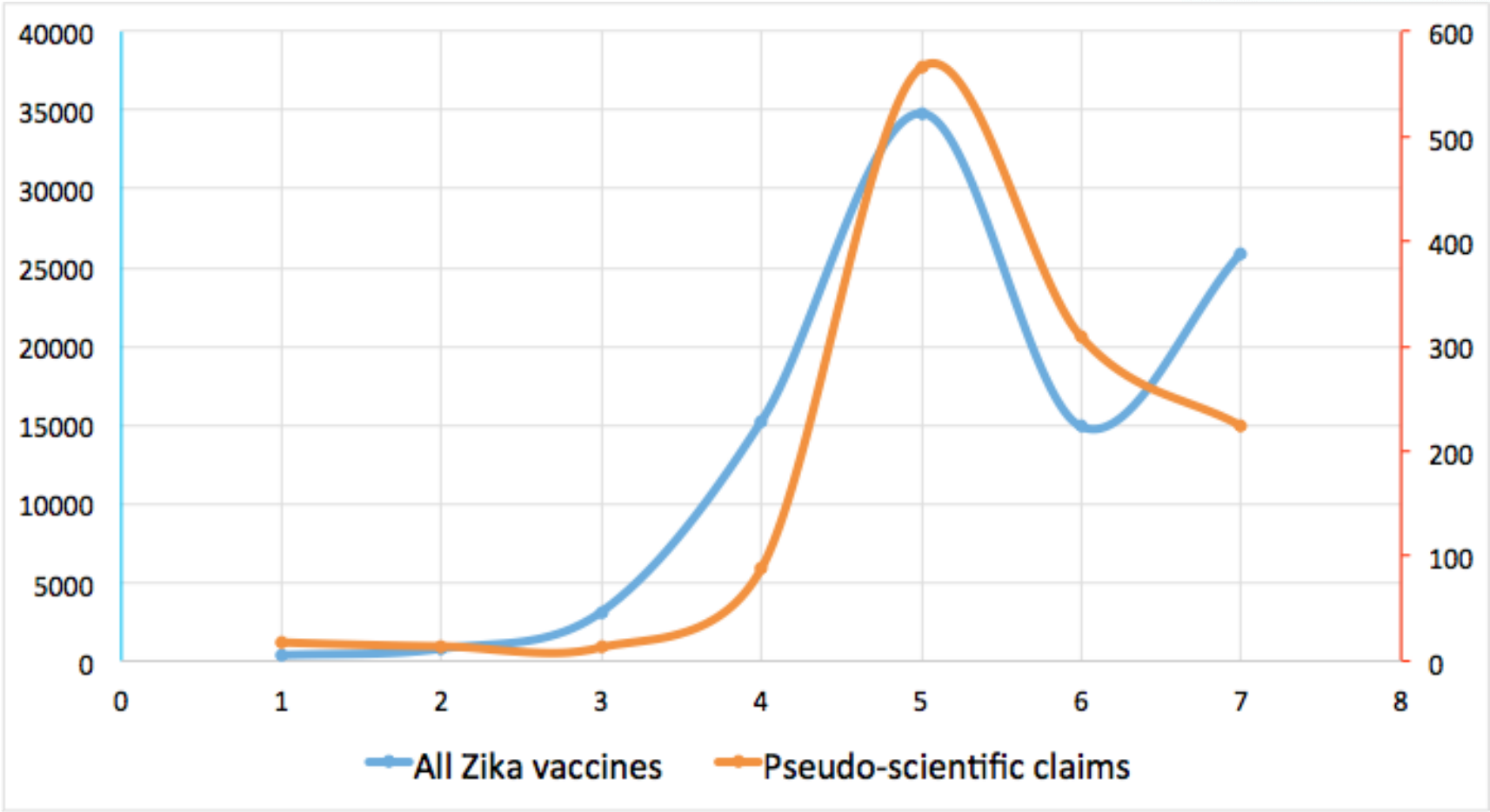
Pyriproxifen doesn’t cause microcephaly

Spurious Correlation:
Mosquitos & larvicide

Dredze, M., Broniatowski, D. A., & Hilyard, K. M. (2016). Zika vaccine misconceptions: A social media analysis. *Vaccine*. http://doi.org/10.1016/j.vaccine.2016.05.008

Pseudoscientific Claims about Zika

- 85% of users previously tweeted about vaccines in 2015
- At least 57% of users previously tweeted an anti-vaccine message



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Pseudoscientific claim: ”DTaP Vaccine Causes Microcephaly”

- “GMO Mosquitos are the cause of the zika virus.”
- “#Zika may help accelerate Sterilization in the US, and with the use of GMO Mosquitoes sterility will be delivered to you, #Depopulation#NATO”
- 0.1 babies had zika, 100% had DTAP given to mother during pregancy? Wonder which caused this?
- Factors:Those pregnant women were #Vaxxed=dtap,GMO mozzies released,pesticides put in drinking water so blame #Zika

Dredze, M., Broniatowski, D. A., & Hilyard, K. M. (2016). Zika vaccine misconceptions: A social media analysis. *Vaccine*. http://doi.org/10.1016/j.vaccine.2016.05.008

Brazilians not buying Zika excuse for babies with shrunken brains

January 25, 2016 theunhivedmind Leave a comment

Jan 25 2016
http://82.221.129.208/ifyouareinamericayouprobablycantseethisj9.html
Jim Stone

Brazilians not buying Zika excuse for babies with shrunken brains

Over 4,000 babies have now been born in Brazil with shrunken brains since November 1 2015. Brazil normally gets approximately 150 cases of this type of birth defect per year, which means that if this all happened in less than a three month time window, abnormal births of this type have increased by approximately 13,000 percent. HERE IS A KEY REPORT

Why are these claims compelling? Fuzzy Trace Theory

- Effective health messages help readers retain the meaning in memory and facilitate availability of the knowledge at the time of behavior implementation
- Two types of memory:
  - Verbatim: precise details
  - Gist memories: basic meaning.
- Decisions tend to be based on gist memories – or the basic meaning – not verbatim facts.
- According to this theory, therefore, websites that produce more coherent and meaningful gist will be more influential (even if they are not factually accurate!).
  - Ex: Child got vaccinated -> child developed autism. Therefore, vaccines cause autism
  - In fact, symptoms of autism appear around the same time as vaccination schedule

Reyna, V. F. (2012). Risk perception and communication in vaccination decisions: a fuzzy-trace theory approach. *Vaccine*, *30*(25), 3790–3797.

Study setting: Disneyland measles outbreak

- Began December 2014 at Disneyland in California
- Led to 111 cases in seven states (as well as Canada and Mexico)
- Cases began among unvaccinated people
- Called attention to the issue of herd immunity
- Led to proposals to curtail vaccine refusal through legislative means

Broniatowski, D. A., Hilyard, K. M., & Dredze, M. (2016). Effective vaccine communication during the Disneyland measles outbreak. *Vaccine*. http://doi.org/10.1016/j.vaccine.2016.04.044

Statistics, Stories…. or gist?

- Ongoing debate: Does including a story lead to more effective communications than presenting ”just the facts” (i.e., statistical data)?
  - Hesitance to include stories because of concerns of appearing biased
- Fuzzy Trace Theory (Reyna, 2012)
  - Verbatim representation (statistical details)
    - ”Measles can lead to pneumonia, deafness, lifelong brain damage, and even death, and almost 1/3 of children with measles have to be hospitalized”
  - Gist: Communicates bottom-line meaning
    - ”Taking any risk that your child could get the measles and suffer serious complications isn’t worth it. Vaccination is the best way to protect your child”
  - Stories are effective because they communicate a gist.
    - Also **cue** motivationally relevant moral and social principles

Reyna, V. F. (2012). Risk perception and communication in vaccination decisions: A fuzzy-trace theory approach. *Vaccine*, *30*(25), 3790–3797.

Analysis of measles media coverage

- Coded 4,581 out of a collection of 39,351 outbreak-related articles published from November 2014 to March 2015
- Measured shares on Facebook
- Used M-Turk to categorize article content: 1) statistics about viruses
  2) statistics about vaccine
  3) ”gist”, or bottom line meaning
  - Positive or negative summary opinion about endorsing or opposing vaccination

Broniatowski, D. A., Hilyard, K. M., & Dredze, M. (2016). Effective vaccine communication during the disneyland measles outbreak. *Vaccine*. http://doi.org/10.1016/j.vaccine.2016.04.044

What led to article shares:

- Results are consistent with Fuzzy Trace Theory
  - Significant effects of gist and verbatim, but NOT stories
- Stories are effective to the extent that they communicate gist
- Among articles with gists shared at least once (n=257)Articles expressing positive opinions about those endorsing vaccination AND those opposing vaccination were 57.8 times more likely to be shared

Coefficients of logistic regression analysis for whether an article was shared at least once on Facebook ($n = 4580$, df = 10).

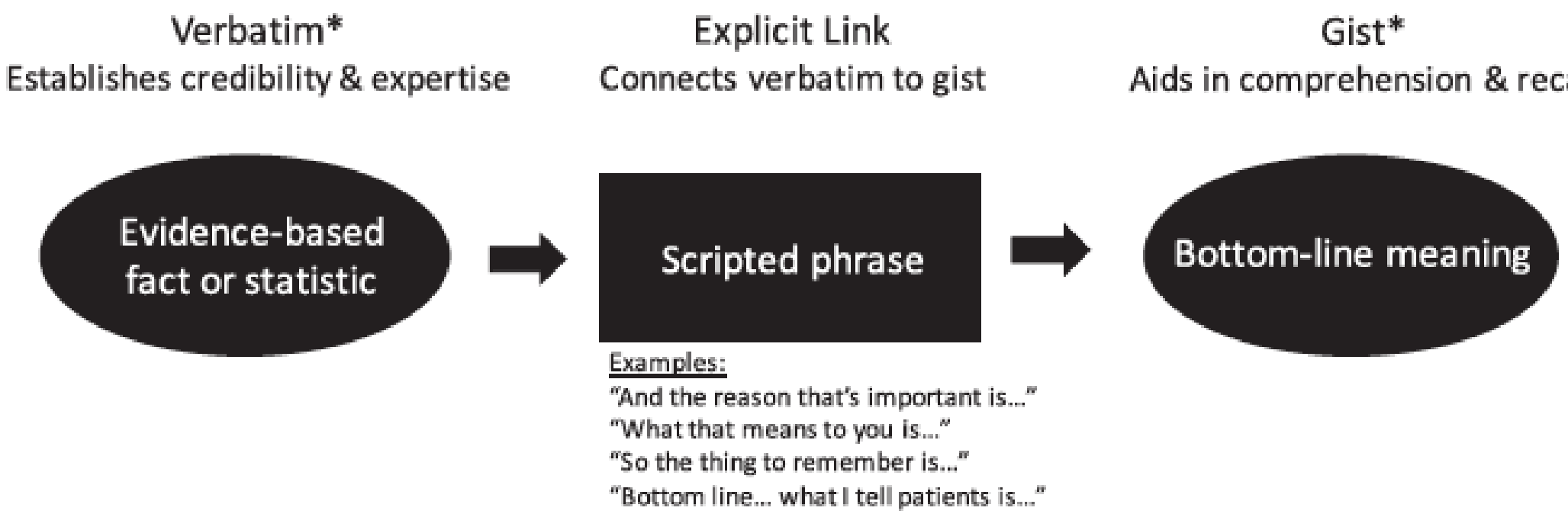
	β	SE β	z-value	OR
Length	-5.56×10^{-4}	8.93×10^{-5}	-6.22^{***}	1.00
Readability	-7.23×10^{-4}	1.49×10^{-3}	−0.49	1.00
Image	0.59	0.09	6.91^{***}	1.80
Stories	0.34	0.19	1.82	1.41
Statistics	0.29	0.08	3.48^{***}	1.33
Gist	0.82	0.15	5.36^{***}	2.27
Stories × Statistics	0.05	0.22	0.24	1.05
Stories × Gist	0.25	0.32	0.80	1.29
Statistics × Gist	−0.17	0.20	−0.85	0.85
Stories × Statistics × Gist	−0.35	0.40	−0.89	0.70
(Intercept)	−1.08	0.12	-8.91^{***}	

Note. $^{***} = p < 0.001$. β = logistic regression coefficient; SE β = standard error of β; OR = Odds Ratio.

Broniatowski, D. A., Hilyard, K. M., & Dredze, M. (2016). Effective vaccine communication during the disneyland measles outbreak. *Vaccine*. http://doi.org/10.1016/j.vaccine.2016.04.044

Proposed Gist Communication Framework

Patient-provider communication technique based on Fuzzy-Trace Theory* [10, 11]



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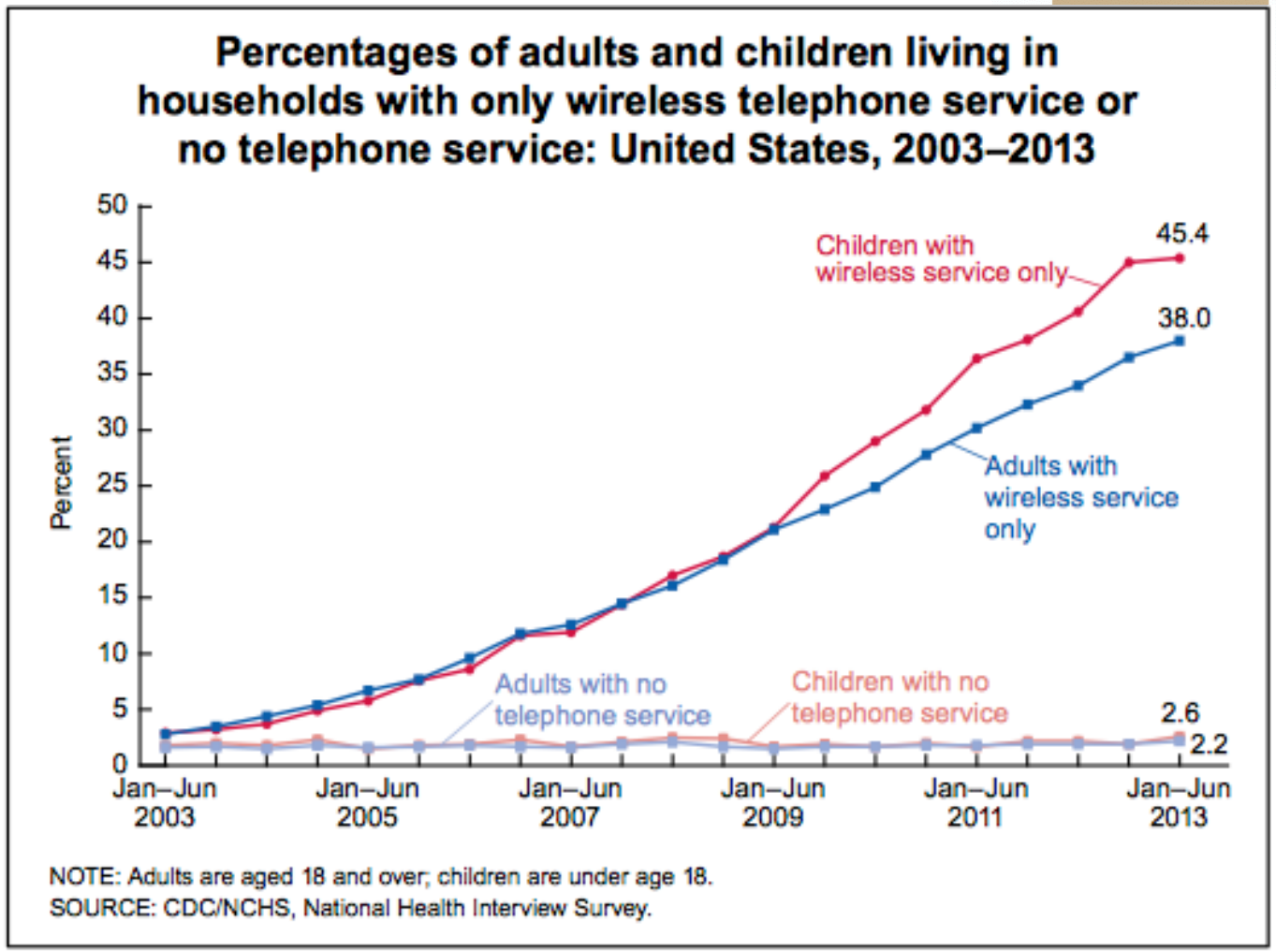
Future directions: Demographics of existing methods

- Many surveys rely upon random digit dialing of landline telephones to gather data. This oversamples:
  - Rural
  - White
  - Older adults
- Circumventing these limitations means intentionally oversampling minorities
  - Surveys may be less representative
- This problem will get worse



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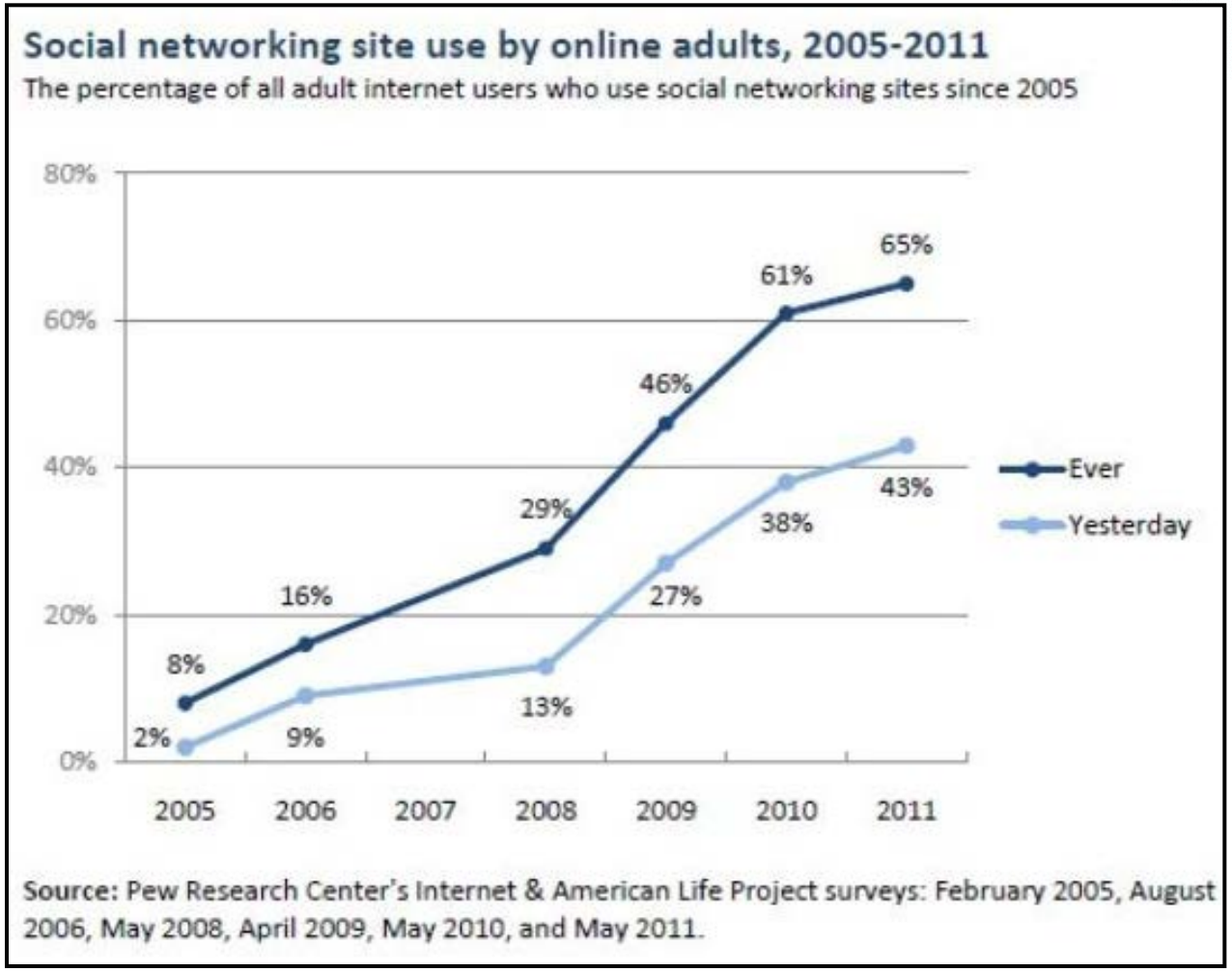
Social media: A new data source

- Social media like Twitter complement survey data
- Quickly and easily collected
- Enables massive statistical analysis
- Available in real-time
- Oversamples:
  - Younger adults
  - Minorities
  - Urban residents



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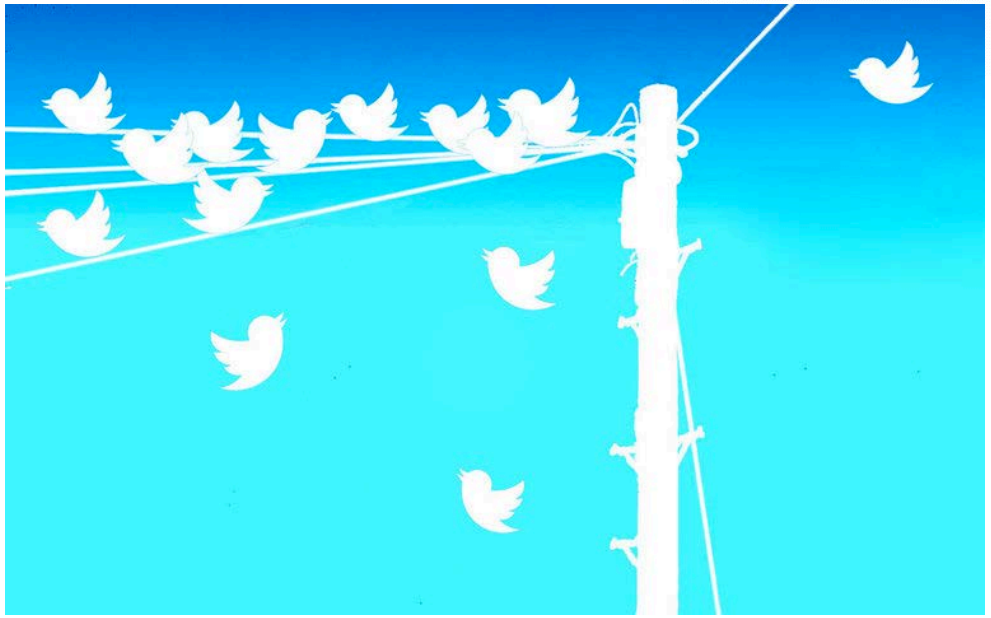
Scientific value: Hypothesis testing

- Social media and survey data complement one another, in terms of:
  - Demographics, clock speed, immediacy analytic rigor
- We aim to develop, for social media, the research norms and practices that characterize high quality survey research
  - We can test hypotheses rapidly with very large samples
- Currently examining the social media response to proposed of emergency-use authorization of H1N1 vaccine
  - Contrast with survey data, e.g.: Quinn et al (2009)
    - Acceptance varies with socio-demographic factors moderated by trust in government



Source:http://media2.govtech.com/images/770*1000/Flickr_Twitter_Telephone.jpg

Quinn, S. C., Kumar, S., Freimuth, V. S., Kidwell, K., & Musa, D. (2009). Public Willingness to Take a Vaccine or Drug Under Emergency Use Authorization during the 2009 H1N1 Pandemic. *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science*, *7*(3), 275–290. https://doi.org/10.1089/bsp.2009.0041

Conclusions

- National security and public health practitioners face similar challenges from narratives on social media
  - Online organized misinformation and/or disinformation campaigns can undermine public health and national security
- In partnership with our collaborators, we are developing new techniques to assess how compelling and influential messages might be
  - Based on empirically validated theory: Fuzzy Trace Theory
  - Complementary to existing survey techniques
- Future directions: Better understanding the drivers of coherent gist communications in online messages
  - How these vary across sociodemographic groups (e.g., different interpretations of emergency use authorization versus standard vaccination)

National Institute of General Medical Sciences
R01GM114771

NIH: Supplementing Survey Based Analyses of Group Vaccination Narratives and Behaviors Using Social Media