

Inoculation Theory

Quick Look

Sara Kitsch, Ph.D.; Monmouth College

Skye Cooley, Ph.D.; Oklahoma State University

Robert Hinck, Ph.D.; Monmouth College

Asya Cooley, Ph.D.; Oklahoma State University

POC: Skye Cooley, skye.cooley@okstate.edu

MESA

**THE MEDIA ECOLOGY AND
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IJO Quick Look Series

Scope and Intent

The SMA IJO effort assesses the ways in which the Air Force (and by extension the Joint Force) can most effectively consider and integrate information into its activities to influence attitudes and behaviors across the competition-conflict continuum. Whether intentional or unintentional, every action or inaction, communicates a message (i.e., we cannot *not* communicate). Therefore, it is important to include communication as a first-order concern in planning and operations rather than an afterthought. As the Joint Concept for Operating in the Information Environment (JCOIE) recognizes, “The future Joint Force will need to transition to a model that helps it visualize how audiences interpret information to facilitate effective and meaningful communication” (JCOIE, 2018).

The challenge of effectively using and communicating information is one that faces all individuals, groups and organizations. There is a broad body of research across multiple disciplines that addresses the issues faced by the Air Force and Joint Force. This Quick Look series mines that literature and identifies the theories, findings and applications that can provide a foundation for Joint Force efforts to effectively integrate information and influence into its activities across the competition-conflict continuum.

Series Structure

This series of Quick Looks builds out from a central hub; a model that lays out the elements and interactions that comprise an effective transactional communication process, and describes how internal and external influences can distort that process, causing miscommunication and misperception. Building from this, we have identified specific topics that bear most directly on the challenge facing the Joint Forces, and provided a deeper dive into these in a dedicated Quick Look. Figure A provides a visual of that coverage, and also illustrates how, through their connection to the central hub, each, while a stand-alone piece, both informs and is informed by the others

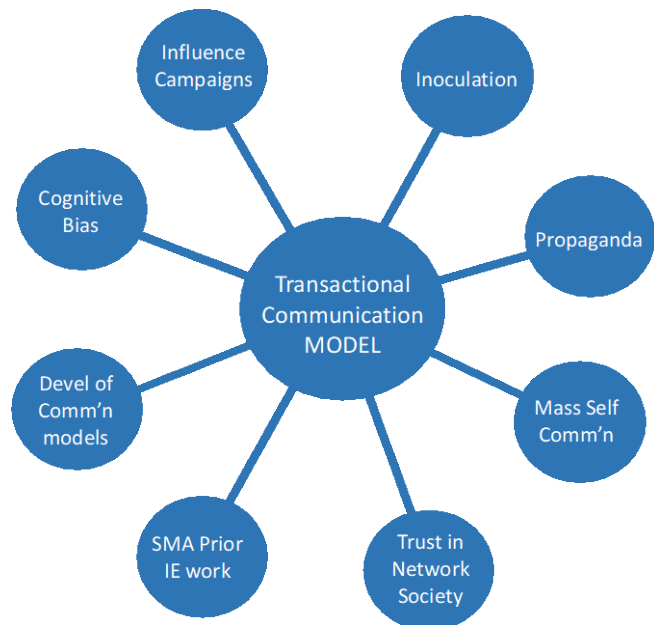


Figure A: Structure of IJO Quick Look Series

Inoculation Theory

Inoculation Theory

Upholds that individuals who are exposed to weakened versions of arguments against currently held attitudes formulate resistance, and the ability to form counterarguments to future threats to those attitudes.

Key Terms

- **Inoculation Pretreatment:** or what would be considered the “vaccine,” contains two components: a threat and a refutational preemption.
- **Threat:** a warning that your attitude is about to be attacked or challenged.
- **Refutational Preemption:** content that helps bolster your current attitude and/or refute the incoming attack.
- **Counterarguing:** process of generating arguments against the attack, crafted by an individual exposed to an inoculation pretreatment.

Key Consideration

Empirical support has been found for Inoculation Theory since the 1960s. Research in the last two decades has found use for Inoculation Theory in fighting fake news, conspiracy theories, propaganda, and even inoculation itself.

Overview

This Quick Look specifically assesses and describes how one area of social scientific research, called Inoculation Theory, can be used to build individual resistance to attitude change, especially as it relates to force protection against misinformation, fake news, and conspiracy theories. An essential part of understanding how individuals are persuaded to change their attitudes involves understanding how they resist persuasion and attitude change (Banas & Rains, 2010). Inoculation Theory has continued to receive scholarly support and attention for the past two decades. As the name suggests, inoculation to persuasion operates in basically the same way as medical inoculation (Compton, 2013). When you get a flu shot, a weakened form of the virus is injected into you, enabling your body to build up resistance to future attacks from the virus (Banas & Rains, 2010). Similarly,

Inoculation Theory maintains that when individuals are exposed to weakened versions of arguments against attitudes they currently hold, they are able to build up resistance and counterarguments to future threats to those attitudes.

Applications of Inoculation Theory have been made to health, politics, and commerce (Compton, 2013). We can also see, and recent research supports, how Inoculation Theory can be applied to help solve pressing twenty-first century issues related to information spread, propaganda, and source credibility. Recent studies, which will be explored in this report, focus on how we can potentially “vaccinate” citizens against misinformation, fake news, and conspiracy theories. This report begins with a summary of the original conceptualization of

Inoculation Theory, followed by updates and advancements designed to address early conceptual and data limitations, and ends with a summary of current research, including practical applications (Banas & Miller, 2013).

Inoculation Theory

As stated previously, Inoculation Theory proposes that individuals can be “inoculated against counter-attitudinal attacks in a manner similar to immunization against viral attacks” (Banas & Miller, 2013, p. 186). The “vaccine,” or what is referred to as the *inoculation pretreatment*, contains two major factors: a *threat* (see text box below) and a *refutational preemption*. The threat warns of an upcoming persuasive attack (e.g., “your beliefs are about to be challenged!”), which in turn highlights the vulnerability of a current attitude and motivates resistance. The refutational preemption provides an individual with content such as information that bolsters current attitudes (e.g., “here is why your current belief is strong or correct!”) and/or example arguments against the attack (e.g., “here is why the incoming attack is weak or incorrect!”) (Banas & Miller, 2013). The goal of the pretreatment is to foster *counterarguing*, which refers to the process of generating

arguments against the attack after receiving pretreatment.

In the 1960s, a series of experiments were conducted to compare how resistance was built up through different types of inoculation pretreatments. These experiments (e.g., McGuire, 1964) tested a) *refutational pretreatments*, where attitudes were challenged, but then counterarguments against those challenges were provided; b) *supportive pretreatments*, where existing attitudes were simply supported; and c) no pretreatments (which served as a control) (Compton, 2013). In the experiments, all participants were exposed to an *attack message* (something that challenged their current attitude or belief) but only some received one of the pretreatment messages (Compton, 2013). This experimental design allowed for comparison between inoculation pretreatments and control conditions. The experiments supported the effectiveness of inoculation pretreatments, with refutational pretreatments being most effective in building resistance to future attacks (McGuire, 1964).

Thus, early testing of Inoculation Theory supported the idea that “inoculating” individuals indeed builds up their mental “antibodies,”

Threat refers to a response to a message—a vulnerability that a position you once thought was “safe” may now be at risk. As Compton (2013) notes, “the mere presence of unexpected challenges to an existing position, or counterarguments, threaten perceived security of that existing position” (p. 222). McGuire (1964) referred to this as *implicit threat*. There is also a threat motivator associated with “forewarning,” in which individuals are warned of an upcoming persuasive attack on their attitude. McGuire (1964) referred to this as an *explicit threat*. With both types of threats, implicit and explicit, vulnerability is apparent, which in turn motivates resistance.

Counterarguing refers to the refutations that are generated following the inoculation pretreatment. In some pretreatments, (refutational) counterarguing is modeled. In all cases, counterarguing refers to arguments generated in support of an attitude as a response (process) to the inoculation pretreatment (Compton, 2013).

helping them to fend off future attacks on their attitudes and beliefs (McGuire, 1964).

However, as research moved beyond the fact that refutational pretreatments work and attempted to explain *how* they work, two limitations needed to be addressed: 1) a lack of empirical data to support *how* inoculation built up resistance in individuals, and 2) the fact that early experiments were restricted to testing inoculation on cultural truisms (widely held beliefs that are rarely challenged). These issues were resolved with later research, which will now be briefly explored (Compton, 2013).

Moving Beyond Early Limitations

How Resistance is Conferred: A major shift in Inoculation Theory involved improving how it was tested (Banas & Rains, 2010). Early experiments (e.g., McGuire & Papageorgis, 1961) involved participants being given one-sentence counter-attitudinal arguments (e.g., a challenge to their attitude) and then being asked to write their own paragraphs refuting it; this process is referred to as *active refutation*. This placed the burden of defending their attitude fully on participants. In other studies (e.g., McGuire & Papageorgis, 1962), participants received example refutations with the attack message and then were asked to continue defining their attitude; this is referred to as *passive refutation*. Thus, in passive refutation, participants had some assistance in developing arguments to defend their attitude. Most studies found the active refutation approach less effective than the passive refutation approach; thus, more current research has shifted to focus on passive refutational inoculation (where participants are given examples of counterarguments to help them build resistance and their own counterarguments) (Banas & Rains, 2010).

Beyond Cultural Truisms: Early experiments in inoculation theory also relied on challenging cultural truisms—beliefs so widely accepted or shared within a particular culture, they would not usually be attacked (e.g., the use of x-rays to detect tuberculosis or the benefits of brushing your teeth) (Banas & Rains, 2010). Naturally, criticism emerged questioning whether or not inoculation would work to foster resistance to beliefs beyond those widely held and rarely challenged. Later research moved beyond these truisms and applied inoculation theory to a host of controversial topics including genetically modified food (Wood, 2007), legalizing marijuana (e.g., Pfau et al., 1997), and animal testing (Nabi, 2003), with all studies upholding support for inoculation.

Current Research and Practical Applications

Overview

A recent meta-analysis of 54 studies covering over 10,000 participants was conducted to test the effectiveness of Inoculation Theory and how it confers resistance.

Overall, this work found support for inoculation, which was shown to be more effective than providing supportive messages (i.e., supporting

Attitudinal resistance can be similarly induced by forewarning an individual of an impending attack on an attitude he or she holds, and presenting a weakened argument against that attitude. The weakened argument will, presumably, motivate the individual to develop counterarguments consistent with his or her initial attitude and, thus, strengthen the attitude against future attacks.

Banas and Rains, 2010, p.283

existing beliefs) or control conditions where no treatment was provided (Banas & Rains, 2010).

The meta-analysis also looked at four moderating variables that have been cited in previous research as either facilitators or mitigators of

inoculation pretreatments. Meta-analysis results (detailed in Figure 1 below) reveal mixed support for these moderators. The authors suggested continued research in each of these areas to continue exploring what helps and hinders inoculation pretreatments.

Overall Inoculation Effects
Prediction: Inoculation pretreatments will confer more resistance than no treatments. Results: Support prediction. Implications: Inoculation is both theoretically and practically effective in fostering resistance to attitude change.
Impact of Perceived Threat
Predicted: Greater levels of threat (e.g., more forewarning or bigger challenges) would build more resistance than lower levels. Results: No support for this prediction. Comments: It is noted that methodological issues could be responsible for these findings; future research should continue to manipulate perceived threat.
Resistance to Novel Attacks
Prediction: Treatment group participants would generalize beyond the initial arguments offered and counterargue new attacks. Results: Support prediction. Practical implications: Inoculation can create resistance beyond the initial attack for future attacks.
Time Delays
Predicted: Moderate time delays between inoculation pretreatments and the attack message would be most effective as compared to longer or no delays. Findings: No support for this prediction.
Involvement
Prediction: Inoculation would be more effective on individuals who were moderately involved with an issue than those with high or low involvement. Results: No support for this prediction. Comments: It is noted that methodological issues in the studies examined could be responsible for these findings.

Figure 1: Four Moderators of Inoculation Pretreatment

Practical Applications

In addition to the continued testing and evaluation of basic inoculation effects, several studies have used Inoculation Theory in an attempt to solve modern day problems. In particular, attention has been given to how inoculation pretreatments can be used to help citizens around the globe avoid the traps of misinformation spread caused by fake news and conspiracy theories, both of which continue to pose an issue for democratic practices. Finally, there has been an initial study into the use of inoculation against itself, in a process referred to as “metainoculation,” which poses interesting possibilities for furthering independent thinking among the public.

Fake News

Increasingly, news is shared through online sources creating the opportunity for false or misleading information to reach massive audiences. Accordingly, the study of the spread of false information has become progressively significant and abundant (e.g., Boididou et al., 2017; van der Linden, Maiback et al., 2017). Although the debate continues over how influential fake news actually is, many Americans remain confused about “the facts” and how to tell the difference between fake news and the truth. This raises important questions for our democracy (as well as government officials, policy makers, community organizers, etc.) as it depends on a well-informed public (Roozenbeek & van der Linden, 2018).

Roozenbeek and van der Linden (2018) suggest we treat fake news like a virus and use Inoculation Theory to fight it. Specifically, their study revisits *active inoculation*, in which participants must generate counterarguments on their own, hypothesizing active inoculation will be more effective at creating generalized immunity to fake news due to the more involved cognitive processing required.

Collaborating with DROG, a Netherlands based group that specializes in education about disinformation, their study developed a multi-player game with the goal of creating intentionally fake news about a given topic. In short, players of the game were tasked with creating this fake news and thinking about how that might be best accomplished. This task exposed participants to small portions of misinformation, but also prompted them to consider how others might be misled by it (the goal of the game) (Roozenbeek & van der Linden, 2018).

Though findings should be considered preliminary, the researchers found support for using active inoculation, as the game “reduced the perceived reliability and persuasiveness of fake news articles” about the assigned topic (Roozenbeek & van der Linden, 2018, p. 7).

A second study conducted by Roozenbeek, van der Linden, and Nygren (2020) that used the same basic methodology showed that the initial finding for the utility of fake news games in building resistance to online misinformation generalizes to multiple Western cultures and across four languages other than English, including German, Greek, Polish, and Swedish. Specifically, and consistent with previous research on inoculation, the study found that “prebunking” or prewarning and exposing participants to weakened doses of

misinformation can build “mental antibodies” against fake news. Participants in this study had significant reductions in perceived reliability of fake news content after playing the game—and variations in common demographic variables (age, education, gender, political ideology) did not significantly change this basic finding (Roozenbeek, van der Linden, & Nygren, 2020).

Results of this second study highlighted that social impact games “can boost psychological immunity against online misinformation across a variety of cultural, linguistic, and political settings,” and led the authors to suggest that media companies, governments, and educational organizations develop large scale “vaccinations” against misinformation. Such interventions, they argued, could be employed in educational programs and adapted for use within existing social media environments (Roozenbeek, van der Linden, & Nygren, 2020, p. 2).

Conspiracy Theories

Although conspiracy theories are not a new phenomenon, they have become increasingly mainstream. Conspiracy theories are assumed to “provide psychological comfort for believers by assigning clear responsibility for unpleasant, complex events beyond their control” (Banas & Miller, 2013, p. 184). Yet they also threaten society by eroding public confidence in democratic institutions and driving extremism.

Conspiracy theories are interesting territory for inoculation research because they defy rational thought, often employ circular reasoning, and yet are difficult to dismiss (Banas & Miller, 2013). As Uscinski, Klofstad, and Atkinson (2016) argue, “It is important to understand why people believe in conspiracy theories because such beliefs may help explain negative political, social, and public health outcomes” (p. 58).

To help combat the spread of conspiracy theory propaganda, Banas and Miller (2013) suggest that we use Inoculation Theory to curb the spread of misinformation. Their study used inoculation pretreatments to build resistance to the 9/11 Truth conspiracy theories. They found that even brief inoculation can be effective against comparatively long persuasive attack messages. In this case, an inoculation treatment consisting of just one single page of text was able to reduce the persuasiveness of a dynamic 40-minute movie clip.

In other work, Uscinski, Klofstad, and Atkinson (2016) extend our understanding of how and why individuals are more likely to believe in conspiracy theories, using traditional theories of opinion formation. The authors note that much prior research has focused on *who* is most likely to believe conspiracy theories and why these beliefs are so difficult to change (e.g., Lewandowsky, Oberauer, & Gignac, 2013; Nyhan, Reifler, & Ubel, 2013), but has failed to provide a theoretical understanding of *why* some individuals believe a particular conspiracy, while others do not.

Drawing on previous research (Zaller, 1992) that found “information is interpreted in relation to predispositions” (p. 60), Uscinski, Klofstad, and Atkinson (2016) examined how predispositions (political and conspiratorial) influence how information from conspiracy theories is received. Study findings provide further support for the idea that how people receive information from conspiracy theories will be a function of their individual predispositions. In particular, an increase in conspiratorial beliefs was found “only for people who are both predisposed to accept conspiratorial logic *and* whose other predispositions are in accord with the conspiracy theory being proffered” (p. 67). Results

suggested that partisanship greatly impacts the likelihood that an individual will see a conspiracy when the conspiracy theory has a partisan element. For example, in the experiment, Republicans were more likely to see a conspiracy behind media coverage as compared to Democrats and Independents due to the longstanding, mainstream suspicion of liberal media bias held by Republican elites. Finally, the study found that a predisposition exists that makes some individuals more likely than others to see conspiracy theories behind events and circumstances. This predisposition appeared independent of partisanship.

Meta Inoculation

Though inoculation has been widely studied, little attention has been given to preventing inoculation itself. Banas and Miller (2013) argue that there is value for doctors, politicians, government officials, educators, and others in persuading audiences that they must overcome inoculation efforts that are levied against them from more disreputable sources. Thus, Banas and Miller (2013) examined how inoculation techniques can be used against inoculation itself in what is referred to as “metainoculation.”

Specifically, the metainoculation used in their study targeted the inoculation process itself, rather than manipulating the content of the inoculation pretreatments. They note: “Instead of rebutting the arguments presented in the inoculation treatments, the metainoculation message described how the inoculation process works and asked participants to consider both sides of an issue and think for themselves” (Banas & Miller, 2013, p. 199). This process reduced the effectiveness of subsequent inoculation pretreatments and yielded support for the first empirical testing of metainoculation.

Conclusion and Implications for IJO

To better understand how individuals resist persuasive attempts and attacks on their existing attitudes, this report has explored Inoculation Theory. Based on the analogy of medical inoculation (e.g., getting a flu shot), the theory proposes that individuals can be “vaccinated” with a variety of pretreatments to help ward off future persuasive attacks on their beliefs. Specifically, Inoculation Theory maintains that when individuals are exposed to weakened versions of arguments against attitudes they currently hold, they are able to build up resistance and counterarguments to future threats to those attitudes.

As this report has discussed, research since the early 1960s has found support for the overall effectiveness of inoculation as a way to foster resistance to persuasion; likewise, applications have been made in various areas including health, politics, and commerce. This report specifically explored the early testing of Inoculation Theory and a recent meta-analysis that both upheld and challenged various elements of previous research, as well as recent twenty-first century applications of Inoculation Theory as a way to combat the spread of misinformation through fake news and

conspiracy theories. As this body of research showcases, Inoculation Theory offers a viable method by which governments, public advocates, educators, etc. can both understand how and why individuals resist attitude change, as well as understand how inoculation can be used as a tool to foster resistance in a variety of areas.

As it relates to the ongoing IJO project, Inoculation Theory offers a scientifically tested method for protecting individuals against persuasive challenges to their existing attitudes and beliefs. It also provides insight as to how to reinforce currently held attitudes that are essential to maintain. In particular, messages crafted in a variety of settings that contain inoculation pretreatments can build resistance to attitude change and foster counterarguing when encountering novel attacks on their attitudes. Moreover, metainoculation—or inoculating against inoculation efforts by explaining how inoculation works and encouraging individuals to think independently about their existing beliefs and challenges to them—has the potential to further protect individuals from attempts to sway their currently held attitudes and beliefs.

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