



Meta-Analysis Of Solutions To Wide-Spread Misinformation

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Abstract

This meta-analysis examines inoculation theory as a proposed solution to widespread misinformation. Inoculation theory can be seen as a critical advancement within the field of cognition security by building resistance in individuals, strengthening their cognitive defenses against emotional manipulation and deceitful fallacies. Analysis in the subsequent pages will reveal that inoculation theory is separated in two subfields: active and passive inoculation, neither of which can be concretely viewed as superior to the other. Results show that almost universally, individuals experience decay in resistance about two weeks after inoculation. This meta-analysis identified gaps and limitations within the research which can contribute to more studies going forward.

Introduction

Misinformation poses one of the most prevalent threats to modern political discourse. Its manipulation techniques are unique and ever-evolving, ever-present in the media surrounding elections and international politics. Misinformation has become more prevalent in other realms as well, where manipulation generates profit. In marketing, health, and public relations, misinformation creates revenue when erroneous information is perpetuated and continually reaches more individuals.¹ Misinformation also poses a threat to public understanding of critical science advancement such as climate change and vaccine safety.² Misinformation can create temporary discourse on a topic, and other times fabricated stories perpetuate falsehoods in a more permanent

or lasting manner. The longevity of conspiracies such as vaccines causing autism is an example of perpetuated misinformation affecting modern, public sentiment and discourses even when they have been disproved.³ Whether the goal is to profit or sow dissent, misinformation is often effective without individuals even realizing it.

Distinguishing between misinformation, disinformation, and propaganda is a critical first step in assessing their relative effects. Misinformation is information that is false or incorrect, regardless of the publishing motive. Mistakes can be made without malicious intent. However, disinformation is maligned, intentionally misleading information purposefully propagated in psychologically deceiving or harming manner.⁴ Propaganda is a type of disinformation sanctioned by a governmental entity to serve an agenda.⁵ This meta-analysis uses the term misinformation extensively and subsumes corporate all forms of false information within the term without making assumptions about the intention behind dissemination.

Inoculation theory constitutes a basic tenant of psychological resistance⁶ and linguistically parallels biological models of vaccine science in countering persuasion methods.⁷ William McGuire developed the theory in 1961 with the goal of inoculating college students against “cultural truisms” and building cognitive resiliency within participants.⁸ Inoculation facilitates individual in building cognitive defenses by exposing them to mild doses, or attacks of deliberately malicious information.⁹ Contemporary scholars have adapted this theory to counter misinformation. Recent applications of the theory include the familiarizing individuals with pervasive persuasion techniques and strive to build cognitive resistance to malign misinformation campaigns.

There is an ongoing debate over methods within inoculation theory. Presently the debate centers on the effectiveness of refutational preemption, or “pre-bunking,” versus post hoc intervention, or “debunking.” These two methods can also be distinguished as either active or retroactive intervention. Research examining the extent to which active inoculation “arms” readers and consumers against misinformation efforts and eliminates or mitigates the negative effects potential persuasion, radicalization, or mobilization arising from false material materials is ongoing and constitutes a large body of literature. The subsequent section briefly examines this literature.

Active Inoculation

A recent advancement in active inoculation efforts is the gamification of pre-emptive subject matter. The first game was originally developed by prominent social

psychologist Sander van der Linden and other Cambridge scientists in collaboration with a Dutch media platform “DROG”.¹⁰ Appropriately named, the *Bad News* game hopes to help its players generate their own antibodies in a brief 15-minute scenario.¹¹ This brand of inoculation intervention educated players on six common techniques of propagating misinformation.¹² These techniques include *Discrediting* opponents, *Emotional* language use, increasing intergroup *Polarization*, *Impersonating* people through fake accounts, spreading *Conspiracy* theories and evoking outrage through *Trolling*, also known as DEPICT.¹³

Technique-Based Active Inoculation

Bad News is categorized as a technique-based inoculation intervention and since its creation many studies have utilized *Bad News* as an independent variable in examining the effectiveness of inoculation and its various facets. Maertens investigating the longevity of inoculation theory adapting methods and results from an original study conducted by Roozenbeek and van der Linden in 2019.¹⁴ Maertens found that after participants completed *Bad News*, consequently receiving an education on pervasive manners to circulate fallacious information, that they were able to find fake news headlines significantly less reliable.¹⁵ These results concurred with the earlier findings Maertens hoped to replicate and found a higher effect size than initially reported.¹⁶

The Refutational-Same Debate

Studies have also been able to analyze technique-based, active inoculation theory through similar games as well. Many have gamified essential inoculation material and created parallel simulations such as *Cranky Uncle*, *Harmony Square* and *GoViral!*. These games all aim to create flexible and personal algorithms to remain up to date which helps prolong relevancy and continues to entice players.¹⁷ In a study conducted by John Cook and others, participants navigated through the *Cranky Uncle* game and learned how they might buy into reasonings that are clearly false and the fallacies behind them.¹⁸ The community college students who participated reported positive feedback, most said “it’s helpful to know when you’re being lied to,” and reported stronger critical thinking skills after playing.¹⁹ Findings also indicated that although parallel argumentation can be especially successful when paired with humor and entertaining cartoons, intervention involving real-world misinformation can offend participants.²⁰ Cook advises that this should be anticipated in other experiments and prepared for if content is particularly relevant or politically charged.²¹

When Thomas Zerback investigated the effects of inoculation efforts against astroturfing strategies (defined as the exaggerated appearance of wide scale support of content through “sock-puppet” websites or bots) his team reported the effectiveness of the refutational-same educational structure.²² Refutational-same inoculation uses similar, real world techniques to build up refutational skills by exposing participants to fallacies and false reasoning deemed to be the same as popular misinformation dissemination tactics. Zerback’s findings contrast with Cook’s assessment. Zerback states that the only effective strategy in combatting astroturfing comments is educating those involved about the exact arguments used by adversaries.²³ The debate over avoiding or utilizing refutational same arguments is an important crossroads in the field, and is heavily dependent on each individual researcher’s goals and motivations for their study.

Broad-Spectrum Critique

A critique of active inoculation that exists is the claim that it lacks broad spectrum immunity because typical active inoculation is limited to a scope relevant only to each situation.²⁴ This claim deduces that because active inoculation is utilized to create resiliency in relation to a specific campaign, whether that be climate change fallacies, vaccine misinformation, Russian propoganda, etc. that active inoculation is over specific in practice, reaching only a narrow-spectrum. Psychologist Stephan Lewandowsky, notes that a more generalized framework for inoculation would “push the theoretical boundaries of the original theory forward.”²⁵

Melisa Basol’s research on the effectiveness of Bad News, advocates that the digital content is an example of broad-spectrum inoculation. She notes that the lack of interaction with political ideology in their educational material allows the game to find effectiveness on both sides of the political spectrum.²⁶

John Cook expanding on prior research explored broad spectrum immunity when investigating the benefits of logic-based inoculation.²⁷ Instead of practicing the techniques one may use to mislead and propagate misinformation such as technique-based inoculation, his research employs, logic-based inoculation.²⁸ Logic-based inoculation seeks to explain fallacies and resistance to them via information identification and resistance strategies in a more methodical manner.²⁹ Cook identifies that this methodical approach is more generalizable and can “convey resistance against the same techniques in a different topic.”³⁰ Cook’s technique may be more applicable to mass inoculation but it can still be critiqued within a broad-spectrum framework for only

addressing one technique at a time. All methods of inoculation can be dissected based on different perspectives that define narrow-spectrum or broad-spectrum standards.

Decay Critique

A critique of active inoculation is the rate of inoculation decay in participants. Once individuals have built up a “resistance”, it is important to analyze how long it can last. The cognitive processes associated with inoculation are primarily individual and internal, as McGuire originally claimed.³¹ The establishment of belief protection is primarily an internal process as well.³² Consequently, decay in resistance is similar in nature and difficult to generalize. While some studies show evidence of effects persisting anywhere between 6 to 33 weeks,³³ most studies align on a two-to-three-week lifetime of inoculation resistance.³⁴ In a meta-analysis of 54 studies testing inoculation theory, results showed a consistent decay in resistance after two weeks regardless of the timeframe between inoculation and attack.³⁵

Post-Inoculation Talk

Facing the challenges of inoculation decay and cognitive diminishment, Lindsay Dillingham and Bovi Ivanov found that vocal post inoculation talk (PIT) or debriefing correlated with an increase in belief certainty and enhanced the protection created internally, and these types of interpersonal discussions can enhance overall resistance.³⁶ Their results fail to investigate the decay rate in PIT conditioned individuals versus non-PIT conditioned individuals, yet are worth mentioning as one of the first studies to examine inoculation as a subvocal process and to add vocal aspects to it.

Passive Inoculation

Another equally important subfield of inoculation theory is passive inoculation. Passive inoculation is also often referred to as retroactive intervention, or “debunking”. Distinctions between active and passive inoculation were made above, but it is important to note that where there is an abundance of literature and studies surrounding active inoculation, there is a more limited amount of research on passive inoculation. Some psychologists rule out passive inoculation prematurely and have given the practice a connotation of ineffectiveness. Yet this to more fully understand strategies to combat disinformation it is important to consider both active and passive inoculation and their appropriateness in different circumstances.

Debunking

One of the most important studies in the field of passive inoculation, or retroactive intervention, was conducted by Jonas De keersmaecker and Arne Roets in Belgium. In this study, participants were given general information about a fictitious woman named Nathalie, a married nurse at a local hospital.³⁷ The brief description is accompanied by a picture as well, and at the end of this description it states “Nathalie was arrested for selling drugs from the hospital; she has been stealing drugs for 2 years and selling them on the street in order to buy designer clothes.”³⁸ Participants then evaluated Nathalie and completed an individual test of cognitive ability.³⁹ Quickly after, a message appeared informing them the information regarding the drugs was incorrect, and they were then asked to evaluate her one last time with the picture and corrected description that no longer included the drug dealing falsehood. Results indicated that after receiving the correction, participants evaluated Nathalie significantly better than they had in their first evaluation. Individuals with lower levels of cognitive ability were less responsive to the corrections, adjusting their initial evaluations to a lesser degree than those with higher levels of cognitive ability. This lingering repercussion is commonly referred to as the continued influence effect (CIE) and much of the work in passive inoculation research has been conducted to find effective ways of mitigating it.

Preventing Continued Influence Effect

It is a much steeper battle to fight to correct something once it has already been circulated, but there have been successful studies conducted on efforts to diminish CIE. Lewandowsky and Linden found an important feature of a redaction, or retroactive intervention, that increases effectiveness. Their research exemplified that corrections of misinformation experience more success when they are paired with an alternative explanation.⁴⁰ Further research in the field also supports this claim, noting specifically it is especially effective when there is salience created between the facts and the misinformation.⁴¹

Adding on to the contextual findings, other research found that passive inoculation is more effective when misinformation is corrected by a trustworthy source. Psychologists Jimmeka Guillory and Lisa Geraci investigated the role of source credibility.⁴² In their study they divided sources into those based on expertise and those with high trustworthiness.⁴³ When a correction was received from a source highly rated in both characteristics, participants demonstrated a reduced use of original, incorrect information. However, a breakdown occurs when participants received corrections from

sources highly rated solely in one of the categories. While answering inferencing question, those who received corrections from expert sources did not significantly reduce their reliance on the misinformation. The study found that only trustworthy sources can decrease use of incorrect information when making inferences.

The research on contextual corrections has detractors who point out that even when trustworthy sources release corrections or individuals are educated through passive inoculation, the damage has still been done. Cambridge researcher Cecilie Traberg identifies that the presence of misinformation alone in one's news sources sabotages and undermines the credibility of even the most accurate, fact-based information.⁴⁴

Anticipating the Future of Inoculation Theory

Some in the research community have begun to analyze inoculation theory from a public relations perspective, adapting the psychological aspects of misinformation resistance to other areas of application and study. From a public relations standpoint, inoculation is viewed as an effective tool in issue management, crisis/risk communication and character management.⁴⁵ Just as participants in previously discussed studies are intended to build defenses against fallacious material, public relations researchers want to preempt the effects of predicted challenges. This would ensure corporations, businesses, and individuals can maintain revenues and keep their reputations intact ahead of smear campaigns or publicly released failures.⁴⁶ The broadening of the scope of inoculation studies to encompass more fields of inquiry and more disciplines is likely to bring more insights. Understanding that disinformation is not a single-issue topic and impacts multiple fields of study make it an increasing concern for a wide array of actors.

Limitations

It is important to identify limitations and gaps within the field. Research and public debates often pose the question of which type of inoculation is more effective. It is in the debate between approaches that the biggest gaps in the field are revealed. A present the field is lacking a robust literature comparing the two techniques side by side.⁴⁷ In the absence of direct comparisons many studies overstate evidence supporting their methodological stance.⁴⁸

Similarly, there are conflicting findings on the importance of emotion in inoculation. Emotion has been customarily viewed as a detriment to cognition and

reasoning, yet some studies have identified emotions as ways of enhancing information processing.⁴⁹ Emotions are multifaceted and impact collective from political party, racial, national, ethnic or other affiliations. Moreover, beyond emotion identity constructs across different dimensions, including political party foster attitudinal resistance to inoculation.⁵⁰

Presently there are a lack of tests at an international scale on inoculation methods within different communities. Studies and results have almost exclusively originated from Western societies, with some even going so far as to describe inoculation theory as an American-based theory and field of study.⁵¹ Consumption of misinformation is becoming a more universal experience, as regimes have begun turning to media warfare as an effective strategy in consolidating power, and businesses have begun to sow profits from similar methods. In the face of growing concern, there is great potential for inoculation theory to be nuanced and adapted to fit collectivist societies that may even reframe and refine how it is being utilized.

Conclusion

Inoculation theory poses an advanced solution to misinformation and cognitive manipulation. It is effective in building up one's cognition security but has limitations. Inoculation can be ineffective if too much of its material is politically charged, or overly relevant to current events, as it triggers cognitive defenses in those who disagree. The theory and implication lacks herd immunity in that inoculation is an individual process building resistance within participants and not among larger populations. Studies have illustrated a consistent decay period within participants of two weeks.

It is appropriate to identify limitations within this individual meta-analysis as well. This is a sample analysis of twenty-five studies, critiques, articles and other works, representative of results and variations within this research field. It is not a population analysis. As much research as possible has been consumed and synthesized to create a wholistic analysis on the work done within the inoculation theory field. There are, of course, gaps and absences within this research. Future analysis will seek to expand on this meta-analysis and engage and replicate the findings within some of these studies.

Endnotes

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