Cognitive Science 3

Transmission of Argument Forms

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Introduction

In any form of human dialogue, skepticism is a natural response. Arguments serve dual roles in daily life decisions and discussions of crucial issues, aiding in the selection of alternatives and explaining or justifying choices (Amgoud et al., 2009). Across the annals of history, scholars in philosophy and rhetoric have consistently characterized an "argument" as a proposition presented to reinforce another statement when uncertainty surrounds the latter's credibility (Wagemans, 2019). According to Parsons et al (2003), when confronted with unexpected assertions, our natural inclination is to inquire and explore the rationale behind them. This corresponds to communication rooted in argumentation, wherein the transmission of information involves the presentation of supporting arguments. Individuals frequently provide supplementary context and preemptively address potential queries by incorporating partial answers into their statements.

In a study conducted by Mesoudi & Whiten (2008) on the multiple roles of the cultural transmission experiment with a primary focus on general cultural transmission rather than specific variations in argument forms, the study provides crucial perspectives on the dynamics of information transfer across generations. Transmission chain studies involve the sequential passing of information through participants, replicating the real-world spread of cultural information. The authors emphasize the susceptibility of human cultural transmission to distortions and biases, resulting in variations and modifications in the transmitted information. Although the study does not directly address argument forms, its findings contribute to a comprehensive understanding of the potential distortions and biases that could impact the transmission of argument forms. Understanding which argument forms are more likely to be stabilized and retained over multiple generations is essential for discerning their persuasive power and robustness. By analyzing the transmission chains, we can identify argument forms that demonstrate longevity and resilience. This knowledge could help pinpoint the key elements and structures that contribute to the successful transmission of argument forms.

Morality tales have been acknowledged as a powerful instrument for conveying moral values and shaping societal behavior (Haidt, 2003). These narratives commonly showcase characters making choices that lead to either positive or negative consequences, thereby serving as instructive lessons for readers or listeners (Escalas & Stern, 2003). Understanding how the valence of stories influences the transmission of moral tales is imperative for enhancing their efficacy in shaping moral cognition and behavior. While previous research has explored the impact of narrative elements on persuasion, emotional engagement, and memory retention (Green & Brock, 2000; Moyer-Gusé, 2008), there remains a relative dearth of research specifically delving into the effects of positive and negative valence on the transmission of moral stories. A similar study conducted by Negrete (2019) using undergraduates found that narrative information is retained for longer periods than factual information

in long-term memory and that narratives constitute an important means for scientific communication to transmit information in an accurate, memorable, and enjoyable way (Negrete, 2019).

Drawing on prior research in moral psychology and narrative persuasion (Hastie & Pennington, 2000; Slater & Rouner, 2002), a hypothesis is formulated that negative moral stories, whether scientifically or fictionally grounded, will elicit stronger emotional responses and higher levels of engagement compared to positive moral stories. It is anticipated that the transmission of negative moral tales will be more effective, resulting in a greater retention of the moral message over successive generations. This hypothesis incorporates both scientific and fictional narratives, acknowledging their potential divergences in the transmission of moral values.

This study aims to employ an experimental design simulating the transmission chain of both scientifically grounded and fictional moral tales. In this study, participants will encounter either a positively or negatively valenced moral story, ensuring comparable levels of extremeness in both scientific and fictional versions. Subsequently, participants will be tasked with recalling and retelling the narratives to the next participant in the chain. Several key variables, including comprehension of the moral message, emotional responses, narrative engagement, and retention of details, will be assessed to explore potential differences between positive and negative valence conditions, as well as between scientifically grounded and fictional narratives. The research aims to shed light on how moral lessons are disseminated and potentially altered within societies, considering scientific and fictional contexts.

Research Question and Hypothesis

The transmission chain involves the transfer of information through a series of interpersonal connections. Each person in the chain becomes a transmitter, receiving the information from one source and passing it on to the next recipient, creating a sequential flow of information. By studying transmission chains, researchers can gain insights into the dynamics of information transmission, including the preservation, modification, or distortion of moral stories as they are relayed from person to person.

In this study, the examination of transmission chains seeks to unravel the dynamics behind the dissemination of science and fiction stories. This investigation delves into how these stories evolve, considering factors such as shifts in argument forms and the valence of the story.

Research Questions

As previously established, we aim to investigate how argument forms, and valence (positivity/negativity) affect their accuracy and transformation during the transmission chain of fictional and scientific stories, Specifically, we seek to answer the main research question:

- RQ: How do different argument forms influence the transmission of scientific and fictional stories, and to what extent does the loss of information vary among these forms?

Hypothesis

We hypothesized the following:

- H1: Argument forms affect the transmission, such that the loss of information varies among the different argument forms.
- H2: Arguments in the form of Modus Ponens have the least loss of information.
- H3: Arguments in the form of Modus Ponens are the least likely to become invalid throughout transmission.
- H4: Arguments of various forms will be transformed for a transmission chain (in retelling) more into the form of Modus Ponens than any other argument form.

Argument forms

Argument forms refer to the structures and patterns employed in presenting reasoning, evidence, and logical connections within a discourse or narrative. These forms encompass the organization and arrangement of elements such as premises, claims, and conclusions to construct a coherent and persuasive line of reasoning. Argument forms play a crucial role in shaping the effectiveness and impact of communication, influencing how information is presented, analyzed, and interpreted within various contexts, including academic discourse, storytelling, and persuasive communication (Wikipedia contributors, 2024).

There are four types of argument forms that we have used:

Modus Ponens:

Modus Ponens is a valid deductive reasoning form in which, if the antecedent of a conditional statement (if-then) is affirmed, then the consequent must also be affirmed. In other words, if "P → Q"," P → Q" (Wikipedia contributors, 2024).

Modus Tollens:

Modus Tollens is a valid deductive reasoning form where, if the consequent of a conditional statement is denied or proven false, then the antecedent must also be denied. In simpler terms, if "P → Q", "Not Q → not P" (Wikipedia contributors, 2024).

Hypothetical Syllogism:

Hypothetical Syllogism is a valid deductive reasoning form that involves two conditional statements. If the antecedent of the first statement is the consequent of the second statement, then the conclusion can be drawn that the antecedent of the second statement implies the consequent of the first statement. In simpler terms, if "P → Q" is true, if "Q →R" is true, therefore if P is true then R is true (Wikipedia contributors, 2024).

Disjunctive Syllogism:

Disjunctive Syllogism is a valid deductive reasoning form based on a disjunctive (either/or) statement. If one of the disjuncts is affirmed, then the other must be denied. In other words, if "P or Q", if "Not P → Q" (Wikipedia contributors, 2024).

Definition of Key terms:

Fictional story:

fictional stories refer to narratives that are created for moral transmission or entertainment, often involving imaginative or invented elements. These stories may include characters, settings, and events that are not based on real-life occurrences but are crafted to convey a particular message.

Scientific story:

Scientific stories in this study are narratives that incorporate scientific concepts, theories, or information within a fictional framework. These stories aim to educate or communicate scientific ideas to the audience in a more engaging and accessible manner compared to traditional scientific texts.

Valence:

Valence refers to the degree of positivity or negativity depicted in each story.

Ethics and Pre-registration

We submitted the ethical review (see Annex 1) to SCI-UM6P ERC on **13 January 2024**.After we got the ethical approval from the SCI-UM6P ERC on **20 January 2024**. We pre-registered the hypotheses, methods, and analysis plan of our study on OSF https://osf.io/fbywr before it was conducted.

Rationale

Our motivation to undertake this study stems from our interest in the uncharted territories of the transmission of argument forms. We are driven by fundamental questions: How do different argument forms impact the transmission of information, specifically exploring variations in information loss, the efficacity, and the stability of argument forms? How does the loss of information differ between fictional and scientific stories within various argument forms? To what extent do stories presented in the form of Modus Ponens demonstrate a lesser degree of information loss compared to other argument forms during the transmission process?

Through the study of scientific and fictional story transmission, we aim to deepen our understanding of how these stories contribute to scientific knowledge and the perpetuation of cultural values. We are particularly intrigued by the impact of story valence on the transmission process and its influence on the reception and interpretation of the information.

This experiment holds significant potential to make substantial contributions to the fields of cultural studies, moral psychology, and narrative research. Beyond academic implications, our findings may

offer insights into the effective transmission of science and moral lessons through storytelling and the preservation of scientific and cultural narratives.

Ultimately, we firmly believe that stories serve as vessels that carry and convey our heritage. Through this study, we aspire to unravel the intricate processes underlying this critical function, advancing our understanding of how different stories of scientific concepts and moral values are communicated and perpetuated.

Our experiment on the transmission of argument forms aims to address crucial gaps in understanding how different argument forms, alongside the valence (positivity/negativity) of content, influence the accuracy and transformation of information during the transmission chain. By investigating both fictional and scientific stories, we anticipate contributing valuable insights into the nuanced dynamics of information transmission within diverse narrative contexts. According to Mesoudi and Whiten (2008), susceptibility to cultural transmission leads to distortions and biases. Our research builds upon this foundation by exploring how argument forms, as vehicles of information could contribute to these distortions, biases and variations. The outcomes of this study are poised to advance our comprehension of how information is transmitted and transformed within cultural narratives, with implications for fields ranging from communication studies to cognitive science.

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