

THESIS

THE C.O.S.M.O.S EFFECT OF SCIENCE INFLUENCERS: A DISCOURSE ANALYSIS OF  
NEIL DEGRASSE TYSON'S TWEETS

Submitted by

Sarah Jane Kubiak

Department of Journalism and Media Communication

In partial fulfillment of the requirements

For the Degree of Master of Science

Colorado State University

Fort Collins, Colorado

Spring 2025

Master's Committee:

Advisor: Rosa Martey

Ashley Anderson

Jessie Luna

Copyright by Sarah Jane Kubiak 2025

All Rights Reserved

## ABSTRACT

### THE C.O.S.M.O.S EFFECT OF SCIENCE INFLUENCERS: A DISCOURSE ANALYSIS OF NEIL DEGRASSE TYSON'S TWEETS

Effective science influencers engage their audiences by discussing ideas and discoveries from scientific research in accessible and appealing ways, such as by referencing popular cultural trends or explaining new discoveries in simpler ways. However, their success depends on public image that they actively construct about themselves and about science in general. An especially successful science influencer today is astrophysicist Neil DeGrasse Tyson (NDT), whose Twitter (X) feed has over 14 million followers and includes posts about a wide range of topics, from recent discoveries about black holes to a humorous analysis of the moon's placement in the 2023 Barbie movie.

This study analyzes the texts of NDT's social media posts to explore how he is a successful science influencer online. By analyzing different aspects of his identity that he draws on, this study addresses his conflicting construction of science in US society. Seven distinct personas emerged as key strategies NDT employs to showcase his expertise as a scientist, influencer, and celebrity. These personas, along with different types of expertise, work together to create a science aesthetic that NDT uses as a marketing tool for his content. The commodification of this science aesthetic enables NDT to achieve success both online and offline, in ways that may surpass traditional science communication. This research is significant because online science personalities may have an influence on how audiences engage with and conceptualize scientific content. Therefore, understanding how science and its communicators

are constructed, performed, and marketed is useful for developing effective science communication strategies in the future.

## TABLE OF CONTENTS

ABSTRACT .....	ii
LIST OF TABLES .....	vi
LIST OF FIGURES .....	vii
CHAPTER 1. INTRODUCTION.....	1
1.1 Goals and Research Questions.....	7
1.2 Organization.....	7
CHAPTER 2. LITERATURE REVIEW .....	9
2.1 Science Social Constructions .....	9
2.2 Norms and Culture Aspects of Science Constructions .....	12
2.3 Identity and Persona.....	14
2.4 Why Neil DeGrasse Tyson (NDT) as a Case Study? .....	22
2.5 Summary and Research Questions.....	23
CHAPTER 3. METHODS.....	25
3.1 Theoretical Framework of the Method .....	25
3.2 Data Collection .....	27
3.3 Trustworthiness of the Proposed Study .....	31
CHAPTER 4. ANALYTICAL APPROACH.....	33
4.1 Scholarly and Scientific Expertise .....	34
4.2 Relatability and Authenticity .....	35
4.3 Notoriety and Fame.....	38
CHAPTER 5. DISCUSSION: TWEET PERSONAS .....	40
5.1 Personas Overview.....	40
5.2 Science Communicator Persona .....	41
5.3 Nerd Persona.....	44
5.4 Average Bloke Persona.....	46
5.5 Philosopher Persona.....	48
5.6 Carl Sagan Wannabe Persona .....	50
5.7 Pedantic Persona .....	53
5.8 Influencer Persona .....	54
CHAPTER 6. DISCUSSION: SCIENCE AESTHETIC .....	57
6.1 Expertise Overview.....	57
6.2 Traditional Science narratives vs cultural science narratives .....	58
6.3 Scientific Representation .....	60

6.4	Celebrity and Influencer .....	65
6.5	NDT's Portrayal of Scientist.....	67
6.6	NDT's Brand.....	71
6.7	Science Aesthetic .....	73
CHAPTER 7. CONCLUSION .....		76
7.1	Trust in Science.....	76
7.2	Concluding Summary .....	79
7.3	Utility of Persona Analysis .....	81
7.4	Limitations .....	82
7.5	Future Research .....	83
REFERENCES .....		85

## LIST OF TABLES

Table 1.	Tweet Dataset Structure .....	28
Table 2.	Number of tweets produced by NDT by year .....	28
Table 3.	Tweets by Time Period.....	30
Table 4.	Personas.....	40
Table 5.	Expertise Tweet Analysis .....	57

## LIST OF FIGURES

Figure 1. Barbie tweet by Neil DeGrasse Tyson .....	1
Figure 2. Astronomy tweet by Neil DeGrasse Tyson .....	2
Figure 3. Culturally relevant tweet by Neil DeGrasse Tyson.....	3
Figure 4. NDT's Twitter Profile .....	68

## CHAPTER 1. INTRODUCTION

After the release of the cultural tour-de-force movie *Barbie*, many took to the internet to share opinions about it. A contribution from Neil DeGrasse Tyson's Twitter, now called X (this document refers to it as Twitter henceforth), famous astrophysicist, was a tweet about how the positioning of the sun meant that the scenes in Barbie's imaginary homeland took place in Florida rather than Malibu, California, as the movie implies (Figure 1).



Figure 1. Barbie tweet by Neil DeGrasse Tyson

Although this movie depicts an intentionally fake and plastic set as Barbie's home, when NDT analyzes the location of the movie, he analyzes it as if it were filmed in a real neighborhood by a real beach. His comment, partly science, partly self-aware humor, is typical of what made this

public intellectual famous on social media and elsewhere. As a trained astrophysicist, NDT regularly shares astronomy content online (Figure 2).



Figure 2. Astronomy tweet by Neil DeGrasse Tyson

However, on his Twitter account, he also comments on a wide range of cultural phenomena, including movies, sports events, current trends, and more (Figure 3).

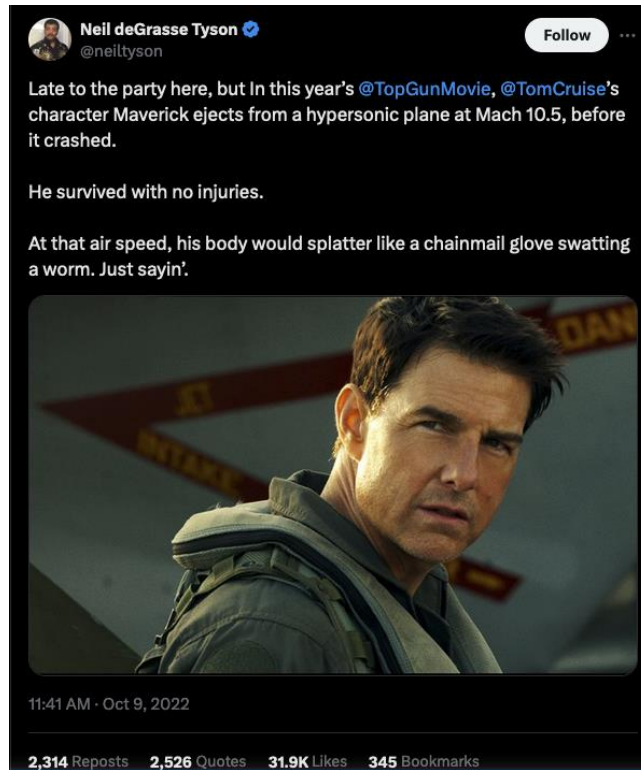


Figure 3. Culturally relevant tweet by Neil DeGrasse Tyson

NDT interjects scientific explanations into mainstream media events by expounding on relevant science information to connect science with cultural phenomenon his audiences can relate to (Haelle, 2015). As a prominent public intellectual, both by the large following on his platforms, large amount of other profitable media appearances and products, his place in culture as a figure of the science community as well as his appointment at the Hayden Planetarium, his tweets are interesting and engaging in part because of the distinct way that he explains complex phenomena and demonstrates the importance of scientific understanding in society. NDT is a prominent intellectual online and may be seen as relatable to his audience because his tweets reflect a connection to his audience through his use of humor, experiences that nonscientist followers can relate to, and tweets that don't rely on jargon and other complicated language that may be confusing. NDT is a "successful online science personality" due to his position as the head of the Hayden Planetarium in New York, his 14.4 million followers, his many published books and

science related podcasts such as Star talk, which has 72 episodes. He also can be defined as successful by his over 30,000 tweets that has the potential to reach many audience members as well as his place as a figure in the science communication community from his appearances on shows such as the Big Bang Theory and his show COSMOS.

In order to understand the ways in which someone like NDT, or a science influencer online, can be an influential science communicator online it's important to look at the aspects of identity that he draws on to confirm his legitimacy to his audience. Utilizing the idea of identity presentation online with persona, or the way that people perform identity online with the consideration of managing their impression for audience members (Goffman, 1959), this research seeks to better understand how science influencers choose what content to create online and how they therein become influential. This online identity is impacted by the social constructions that are present in the cultural mainstream, and shape ideas of what science is (Kuhn,1970; Pinch & Bijker, 1984). Since different groups with varying backgrounds and expertise can have a different conception of science this can cause tensions between the different communities since their understanding of science might be differ. However, these constructions also reinforce and shape the norms of science in society (Chimba & Kitzinger, 2010; Mendick & Moreau, 2013; Previs, 2016; Steinke, 2005). If someone consistently sees similar images of a scientist, then that norm will be reinforced in the culture. Or cultures such as the science communication community may draw on these to establish their own practices. In order for a science communicator to earn legitimacy and be seen as credible matching these norms may make that easier.

Inherent in the acceptance and prevalence of these norms in cultural understandings of science is also the idea that trust, credibility, and legitimacy stem from how well a person's

identity matches the expectations that audience has around these norms. In order for someone to be established as a credible source of information, the audience has to trust that the person is giving factual information but also other factors such as credibility, trustworthiness, expertise and authenticity (Hovland & Weiss, 1952). Perceived expertise, the idea that the public intellectual has expertise to speak on the issue whether or not they actually have it (Fahy, 2022), can be earned more easily when one matches norms and contributes to the trust people have in an influencer. If they do not match these norms, they may face challenges in earning perceived expertise and legitimacy with their audience. In this sense, as a producer of content, an influencer may then draw on different aspects of their expertise, of their relative fame, or their ability to relate to their audience to help them either match norms or compensate for norms around science. As a science influencer, science communicator, or scientist, there are rules within the community that dictate what is acceptable behavior, and this in turn shapes the perceptions of science by fitting acceptable behaviors, displays of science, and communications techniques into these categories. To understand what makes a prominent public intellectual like Neil DeGrasse Tyson successful and influential, it is helpful to examine the aspects of his identity that he draws on within the content he produces on Twitter and how they may change over time.

As this project intends to understand both the production and the texts itself, critical discourse analysis offers insight into the meanings that come from the text. This approach also offers insight into the cultural implications of language and content as well as cultural information about the producer of the text. Since NDT contributes to the culture around science communication as well as holds a position of authority around science, this method offers a useful framework for analysis. This research contributes to understanding how science influencers choose to share science content online and how that could impact the ways that

others may perceive science. This framework of analysis offers insight into the cultural pressures that influence the content choices made by online personalities. These public identities are shaped and reinforced by the norms and culture online. Using an identity and a branding framework connects the motivations for producing certain types of content with the image of science that is shaped online, in an online environment wherein success correlates to high levels of engagement from audience members. In order to understand the role of scientific knowledge in society its crucial to understand how these constructions are produced and how they impact the trust and credibility of the science communicators online. However, as a note, this research is limited by the production of the texts itself and cannot make claims to the broader ways in which science is perceived in society and or what motivations a content creator may have. In this way this work is an in depth understanding of the texts of the tweets NDT produces and cannot account for the direct audience interactions and or implications that these tweets might have on how people perceive science content or information.

As of April 2022, under new ownership, features, content, and the expectations around Twitter changed in significant ways that has impacted the way that celebrities, influencers, politicians, journalists, and others have used the platform online. In early 2021 23% of the US population used Twitter, however after the subsequent purchase of Twitter by Musk, 60% of users said they had taken a break from the platform (Chapekis & Smith, 2023). After the Musk purchase, highly active users also posted less frequently on average with a decline of about 25% tweets, and the vast majority of tweets are reposts and replies (Dinesh & Odabas, 2023). This could be due to changes of the platform such as a temporary cap to tweets read per day, unbanning of controversial accounts, a monthly fee for verification, and other major changes

(Robledo, 2023). These changes have impacted the user based on Twitter and subsequently the content produced on the site.

This study's data was collected before the changes took place under new ownership in July of 2023. Therefore, the data collected was of the old Twitter, rather than the new changes under the ownership of Musk during and after the rebrand to X. With this in mind, this study will refer to X as *Twitter*, since this reflects the online space when data was collected in March of 2023. Future research should investigate the changes to Twitter and its impact on science influencers.

## **1.1 Goals and Research Questions**

The goal of this thesis is to understand how famous science communicator Neil DeGrasse Tyson draws on different aspects of his identity online to be influential and successful as a science communicator. This analysis contributes to the body of work around science influencers and the factors that contribute to their success. The research questions for this project are:

- **Main RQ:** How does NDT establish his identity as an influential science communicator on Twitter?
  - **RQ 1:** How does NDT draw on his expertise, fame, and relatability on Twitter?
  - **RQ 2:** How does the ways in which NDT constructs his online persona on Twitter change over time?

## **1.2 Organization**

Chapter 2 discusses the theoretical framework of the study by describing the cultural impacts that can shape the online identity of science influencers followed by a description of the factors that contribute to the trust in these influencers online. Chapter 3 includes a description of

the methods, data collection and sample procedures as well as the trustworthiness of the study. Chapter 4 describes the analytical framework, including the conceptualization of tweet categorization, the limitations of this study, and the concluding summary. Chapter 5 describes the discussion section related to tweet personas found within the study and analysis of each persona. Chapter 6 discusses the overall themes from the analysis of the personas and types of expertise. Chapter 7 concludes the overall findings, discusses the limitations and future research.

## CHAPTER 2. LITERATURE REVIEW

### 2.1 Science Social Constructions

Understanding the role of science and scientific knowledge in society is not exclusively the domain of astrophysicists, biologists, chemists, and other scientists. A complete picture of the social and cultural position of the idea of science itself requires social and cultural analyses, such as those in sociology, science, and technology studies (STS), communication, psychology, and other fields. Cultural scholarship from these disciplines argues that science should be understood as socially constructed; that is, that science advances as a progression of intellectual frameworks dominated by the social groups that construct them (Kuhn, 1970; Pinch and Bijker, 1984). Symbolic interactionism, or the shared meaning that is attributed to symbols, images, and language (Carter & Fuller, 2015), suggest that science as a framework is constructed by the language and imagery used to create and maintain scientific knowledge (Berger & Luckmann, 1966). Different communities, including practicing scientists, science communicators, and science influencers, therefore, contribute distinct notions of science that reflect their respective goals and values (Toscano, 2012; Winner, 1980).

Science influencers can be a form of online celebrity however not all influencers are celebrities and vice versa. This difference is dependent on the economic output produced which can be indicative of celebrity status (Rojek, 2001). Science influencers also have a mutual relationship with their audience, influencers specifically have feedback and often respond to their audience to maintain their engagement and success. Social Norms Theory, or the idea that behavior is influenced by the perceptions of behavioral norms (Berkowitz, 2004), suggests that audience members construct different notions of science based on the social rules of the

environment they are in. As a result, public constructions of science may consist of distinct and sometimes conflicting images of science crafted by and negotiated within different social groups. These public constructions of science can be understood and analyzed within the framework of identity. While in person they may not be strategically thought out, in online spaces this could look different. However, facets of identity can conflict if they are trying to fulfill different roles for distinct communities.

### **2.1.1 Tension in Science Constructions**

Norms and culture impact the tensions that arise around different constructions of science online. These can be thought of as generating a type of image of science (Du Gay, 2013; Toscano, 2012). The Schwartz theory of basic values is the idea that personal values held by a community get prioritized by these groups and are socially attributed (Schwartz, 2012). This idea suggests that this image contributes to how society places value on science content creators, the feelings people associate with science content creators, and the role science places in society (Du Gay, 2013; Winner, 1980). For example, scientists may see science as a means of progress that benefits from uncertainty as an aspect of investigation. However, for the non-scientist public, science may be the converse: a way to determine certainty and consensus that generates trust in its findings (Funk, 2017). Thus, a science content creator could construct and share content in alignment with one specific construction and/or image, but if it does not match what the audience sees as science, it can cause rejection of their expertise and value, and they lose credibility to that audience member as suggested by social judgement theory, or the idea that people's current attitudes shape how people chose to share information based on how it matches to one's own perceptions (Sherif, & Hovland, 1961). Since different communities have different social constructions that contribute to these tensions, this means that the performance of the image of

science is different for each community. Since members rely on image creation from other community members a person's understanding of science will look contradictory for someone who is not a member of that community or group.

### **2.1.2 Science Social Constructions Online**

Social influence theory, or the idea that people are influenced by the thoughts and actions of others (Malhotra & Galletta, 1999) suggests that on platforms such as Twitter or blogs, constructions of science are also influenced by active contributions from commenters, links to other information such as news or academic articles, and reader engagement such as shares and likes. Online spaces foster a place for immediate feedback and gives more people the ability to “weigh in” on what constitutes science. Neubaum and Krämer, (2017) suggest that the immediacy and feedback of online spaces creates an environment that can influence how groups and individuals perceive science, its role in society, and its specific claims. Importantly, these spaces also can contribute significantly to notions of not only what science is, but who scientists are.

Davies and Horst, (2016), suggests that these categorizations reflect the distinct social construction online that differing science identities have, by tapping into the principles and norms that each identity values. As a result, constructions within these categorizations can have different value systems, e.g., researchers value contributions to science more than communicating content to the public because of the systemic structures of academia (Hall, 2014; Powell et al., 2022). Coordinated management of meaning, or the idea that people coordinate and manage meaning in conversations between each other (Miller & Davidson, 2019), suggests that the value systems within each construction shape the intentions embedded in these oriented content and aids in the interpretation of science's purpose to society. Jacobson, (2013) suggests

that online, the audience is an important aspect of feedback that determines what should be considered science and therefore contributes to the construction of science identity and social perceptions. Continuous feedback from the audience establishes the understood rules of these interactions and this then produces a consistent role for the influencer to perform in each interaction. Although this process is often flexible and mutable based on the types of interactions there is consistency throughout the roles that the influencers perform online. However, because science identity is not a monolith, each specific online group accepts specific constructions that align with their values and matches the expected norms seen through prominent representations online in their communities. In online spaces specifically identities can be actively and strategically created, especially by popular communicators. These active constructions of an online personality are what shapes their online identities, and the personality that the audience members utilize to attribute values, norms and principles that affect whether or not they will listen to this person.

## **2.2 Norms and Culture Aspects of Science Constructions**

The norms and expectations around identities of scientists are deeply embedded in cultural and social histories of societal structures, power relations, and social norms. Feminist standpoint theory, or the idea that knowledge is socially situated and therefore certain groups may be disadvantaged when acquiring this knowledge (Smith, 1974), suggests that these norms, including looking white or being a man, contribute to perceptions of legitimacy for scientists in these online spaces to the extent that they match norms (Chimba & Kitzinger, 2010; Mendick & Moreau, 2013; Previs, 2016; Steinke, 2005). The adoption of the norms within a group, as the process of norm internalization (Batzke & Ernst, 2023), in online communities shapes the identity of science and scientists by establishing meaning through language (Christidou et al.,

2004). In addition, intersectionality theory suggests that there are also systematic barriers that are reinforced by and enhanced by social norms (Crenshaw, 1989), which in turn shape knowledge production (Rainey et al., 2018), reinforce the constructions of scientists (Cheryan et al., 2013), and impact the credibility of perceived authority. For example, Chimba and Kitzinger (2010), found that in media representations women scientists were very few and represented as exceptional whereas men were the norm. They argued that this limited representation reflects and perpetuates that woman only welcome in the public stage in roles such as science communicators. These norms limit the legitimacy of women since they do not match what audience members perceive, when someone matches these, they earn that legitimacy rather than having to negotiate this legitimacy.

Contextual model of science communication, or the idea that the context of science information is dependent on what the audience needs for understanding (Khairy, 2019), suggests that once perceived expertise is established in online spaces, a science influencer or science communicator shows their value by translating science content for the public to maintain their credibility (Davies & Horst, 2016; Höttecke & Allchin, 2020). Cultural identity theory, the idea that communication processes help to construct a cultural group identity (Unger, 2011), argues that a member's identity in a group is based on shared characteristics and accepting thinking patterns and cultural structures (Unger, 2011). This literature suggests that science communicators accept the online culture they then use these online communities to negotiate shared meaning and promote the value of science and of themselves in society. This literature implies that legitimacy as a science creator stem from maintaining perceived expertise online with their audience and is established by matching norms and adhering to the specific social constructions of science that the audience members expect. If a personality matches the expected

persona of a scientist online, then they will be seen as an expert and they will have value to their audience members. For example, Hwang et al., (2016) found that for the space science culture on Twitter, the higher user engagement tweets were those that used features that were important to the community. Since these norms matched the expectations of the audience, it was much easier for the community to accept the information being presented to them and provides value by being a trusted source of information. Therefore, acceptance of a culture or norm online is important for maintaining an identity that audience members accept since these features are part of what determines the legitimacy of identity online. By associating a person with a community, a person can gain that expertise. However, this can also backfire if someone does not match the norm easily, and in turn their identity online may shift to accommodate that.

### **2.3 Identity and Persona**

Goffman's idea of presentation argues that people will manage their portrayals in specific environments (Miller, 1995) by controlling what they communicate or how they communicate. Thus, in an online context, this notion would suggest that people manage the impressions they perform, which allows them to attract an audience and become a hub for information (Brems et al., 2017). Within this social performance paradigm, the performance online allows users to signal relationships, perform values and public intimacy (Kaplan, 2023) to craft an identity of themselves online for the audience. However, identity online is also a form of self-presentation within a community that will address the imagined audience and help shape content (Marwick & Boyd, 2011). Online, there is opportunity to present oneself in a more anonymous sense, or in a more public form such as on Facebook (Hollenbaugh, 2021). In these more public forms of identity, there is also management that happens from the audience, shaping specific aspects that one may show or through content by others, like engagement features (Hollenbaugh, 2021). This

can have an impact on the aspects of the identity one chooses to show online and depending on the audience might shift the kind of personality one may take (Vitak, 2012), and it may shift over time in these spaces. In this sense online identity has different facets and in different interactions with other online members, the person may draw on different features of their identity.

Persona is a facet of identity, in the sense that it is a performance of identity that is impacted by the engagement from the audience (Marshall, Moore, & Barbour, 2020). Online a persona is management of impression from the audience, specifically the micro publics around the creators that help shape and regulate the rules of the community (Marshall, Moore, & Barbour, 2020). Persona has shown the interactions between the identities formed and audience management of that identity through science personas (Bosch, 2013; Daston & Sibum, 2003; Niskanen et al., 2018), professions such academics, lawyers, and artists (Marshall, Moore, & Barbour, 2020), and celebrities (Marshall et. al, 2015). This impression management also applies to nonprofessional identities such as spatial self (Schwartz & Halegoua, 2015), and racial identity (Florini, 2014).

For a celebrity or an influencer they themselves are a cultural commodity and their persona or personality and self-brand is part of the commodity (Marshall, Moore, & Barbour, 2020). A celebrity performance of identity is not just limited to the texts online, this persona also comes from the paratextual industries around them, such as from interviews, fandom, advertising, and corporate sponsorships and can reinforce certain aspects across different platforms (Marshall, Moore, & Barbour, 2020). However, with such public facing roles there is also significantly more feedback from the audience on their performance. Therefore, in order for them to maintain the status that they have, celebrities are under constant surveillance and management of their online persona, and often across many platforms (Marshall, Moore, &

Barbour, 2020). As a celebrity, or public science intellectual, there is a constant connection between media presentation and offline identity that maintains the need for consistency in the form of a self-brand. In this sense identity and branding blur, in order for the personality to be successful they must tap into the expectations that their audience has, such as a type of expertise, or being a trustworthy producer of content.

Neil DeGrasse Tyson's identity online is an aspect of the persona he strategically crafts. As a celebrity and public intellectual, he may draw on certain aspects online that help enhance the persona to fit consistently across the many platforms and meet the expectations of his audience. The facets of the identity that NDT shows online may have an impact on the way that people interpret who he is. By extension, connecting the aspects that draw on his science expertise with other aspects of his identity in turn may impact the interest the public has in science content.

### **2.3.1 Trust and Credibility**

In order to trust science content online, someone needs to trust the person that is sharing that content – its source (Guidry et al., 2017). Prior studies of public engagement with science have found that online environments are central to perceptions of scientific research and to opinions about its value in society (Brossard & Scheufele, 2013; Newman, 2022). Takahashi and Tandoc, (2016) also argues that social media promotes a positive relationship between public trust in science and positive perceptions of science (Takahashi & Tandoc, 2016). The availability of science information and news online allows for people to interact with it and add meaning to scientific ideas and claims by expressing feelings online and learning from others.

In order for science to be trusted it should be seen as credible, and specifically this depends on who the audience sees experts based on their trust in their credibility (Berdahl et al.,

2016). Source credibility theory and congruency theory argue that the persuasiveness of a message is affected by the perceived credibility of the source (Hovland & Weiss, 1952; Usakli & Baloglu, 2011). For example, in Li et al., (2016) they found that information leaders, such as the pope, need to fit the expectations that the audience has for being a knowledge authority. If they are not trusted to speak on science topics, it may cause a backfire effect (Li et al., 2016). Source credibility also says that in order to understand the attitude towards an influencer the main factors are credibility, trustworthiness, expertise and authenticity. Congruity theory on the other hand depends on the congruency of their message is with the viewer's own thoughts in order for the person to accept the influencer (Usakli & Baloglu, 2011). Research suggests that trust may stem from similar value systems (Verma et al., 2017), trust in an institution associated with the content (Negură, Gaşper, & Potoroacă, 2021), or how someone's perception of a personality's expertise aligns with their own expectations (Berdahl et al., 2016). For example, in Berdahl et al., (2016), they found that while the features of assessing credibility were the same for nuclear energy stakeholders, the audience members differed in what made someone an expert. This means that for each audience, the expertise presented needs to be congruent with their own expectations of what expertise should look like.

If someone sharing science online matches the reader's notion of expertise, then that person is more likely to trust the content. However, matching a person's notion of expertise does not automatically make information credible, and this reliance on trust in the creator of content, without thinking about the credibility of the information itself, can lead to the spread of misinformation (Lewandowsky et al., 2012). Trust in digital spaces stems from audiences being able to relate to the content creators, how much their values align, and how well they match the values and expectations of the audience (Jin et al., 2019). To achieve trust within a community a

creator may need to perform a specific role that gains them trust within the community and maintain that credibility within the community. Therefore, in this sense their identity and its facets may be adjusted to maintain and achieve credibility for what they do. A science creator may also alter their identity online to match what their audience expects (i.e., the norms of that groups) to gain or maintain that expertise, or to be seen as more relatable or authentic. One aspect of trust online is the source or creator being accepted by the audience to be a source of information on the topic (Brems et al., 2017). The impression that the creator has on their audience is carefully crafted to help foster trust, and to convince the audience that they are trustworthy for the information they contribute online.

### **2.3.2 Perceived Expertise of Science Influencers Online**

In order for a science influencer to have perceived expertise in the science information that they are sharing, the influencer needs to be trusted and credible to share that information. Trust is a precursor to perceived expertise. The social constructions of expertise, or when knowledge leaders are trusted sources of information based on extraneously attributed levels of expertise (Ohanian, 1990), suggest that perceived expertise online is sustained by the representations of science through its social constructions. Therefore, expertise is mutually constructed between the audience and content creators, which establishes the value that science content creator produces online. This is influenced by the type of source, content, post author, and (visible) public interactions in online spaces such as Twitter.

If a given scientist matches mutual constructions of scientific expertise, they earn perceived expertise and are trusted to speak on science topics (Fahy, 2022). Perceived expertise, or the idea that the people attribute a level of subject knowledge based on heuristics such as credentials or language use (Thon & Jucks, 2017), by the wider community may not match a

creator's own training or academic expertise, but because the expertise is already established in the community, it may not matter (Hogle, 2002).

Perceived expertise contributes to social influence on science topics among the public, but this does not necessarily equate to influence within the science/academic community, according to literature on science influence (Majid et al., n.d.). Science influencers are perceived as experts online who share science content and maintain their influence by marketing themselves with an established brand in science communities (Chinn et al., 2023). Source credibility, or degree that people trust what a source tells them (Hovland & Weiss, 1952), self-congruity theory, or the idea that people prefer sources that they associate with and relate to (Usakli & Baloglu, 2011), and as found by Kim and Kim, (2022), Han and Balabanis, (2023), and Hermawan, (2021) relatability, authenticity, and credibility are the core aspects of an influencer's brand that establish the high engagement needed for success. Thus, creators' perceived expertise is related to how well they match the norms of who has authority as a scientist in society. This suggests that perceived expertise in online contexts is different from expertise in other domains, such as academic or industrial, and can impact how audience members view and accept science content. For an identity to be successful online as a hub of information the personality (Brems et al., 2017) needs to have some form of perceived expertise. If the impression that they put forth is accepted by the audience members then the information received is accepted, and they earn the respect of the audience members, and have that expertise be a part of their established brand online.

### **2.3.3 Science Influencer Branding**

In order to examine the relationships between norms, identities established in specific media spaces, and audience perceptions, it is helpful to use a framework of *branding*. This lens is

frequently applied to – and used by – social media influencers, including science influencers – in the strategic design and distribution of their content. Science branding, then, is the image of science that is created by authors and their audiences (Newman & Beets, 2023). It establishes the value of science and scientists in society through the language used to describe them (Du Gay, 2013; Toscano, 2012). Thus, perceived experts can establish what counts as science and how it fits within a cultural identity to create a connection for the audience (Singh & Sonnenburg, 2012). The active decisions required to establish and maintain a brand create a unique identity with the aim of marketability through co-creating a story with the audience for this “product” (Gao & Feng, 2016; Jokinen, 2016.; Singh & Sonnenburg, 2012). Therefore, a science influencer constructs a narrative identity of science online that reinforces social constructions of science that enhance their value to society, that may change over time.

This strategic marketing of science content establishes science’s identity for influencers and makes it a cultural commodity worth being consumed (Fahy, 2013). It is important to note that such efforts are also key components of generating revenue from public engagement for scientists and the platforms they use. As a celebrity and influencer, identity plays an important role, such as NDT, and that can increase their influence. By extension the branding of a celebrity impacts how people perceive them since as a celebrity, their identity and brand is carefully constructed to make them marketable to the public by a pr agency or communications team. By implication, the goals of a science influencer brand include not only those stated above related to establishing trust, translating science for comprehension by the public, and entertainment, but also effective monetization and profit. Thus, pro-social goals such as connecting the public with scientific knowledge are combined with capitalistic goals of generating profitable products, which may or may not conflict.

The importance of a branding framework is that it connects the social constructions of science with branding that influencers utilize online for both them and the “product” that is the notion of science itself. This endeavor includes selling ideas of what science should be and what it looks like online. This specific framework connects the motivators of the constructions of science (norms, perceived expertise, and trust) and the outcomes seen online (representations, social constructions, and culture). Branding as a framework helps researchers to understand the identity of science and how the motivations and outcomes work in conjunction with the economic and industrial contexts in which this communication emerges. While branding typically denotes a specific all-encompassing persona across all platforms this is not necessarily the case for this project. Instead, branding is an important aspect of persona and identify performed online, specifically personal branding, focuses more on knowing one’s own skills and marketing it in a carefully constructed way to audience members (Brems et al., 2017). This active construction of an identity allows a creator to craft an aspect of their media presence that focuses on making themselves seen as a source of information.

Research suggests that science branding and its image shown online can have an impact on what people do with science information both on- and offline (Newman & Beets, 2023). This research has found that the way that science information is portrayed online has an impact on the ways in which people interact with (Li & Molder, 2021), support (Macoubrie, 2006), and think about science in their daily lives, in their decision-making (Bradshaw et al., 2021), and in their perceptions of policies related to scientific concepts (Jang, 2014). Although the literature suggests that online science communication may not be the best vehicle for opinion change, it might expand knowledge and interest in science among the public (Brossard & Scheufele, 2013). Therefore, if science communication messaging is crafted with the audience and their

experiences in mind, it can help promote more interest in science and foster positive interactions with science. This suggests that the different social constructions of science online, and the resulting levels of trust in conflicting constructions of science content, are vital considerations in the role of scientific knowledge in society.

#### **2.4 Why Neil DeGrasse Tyson (NDT) as a Case Study?**

One prominent science personality is Neil DeGrasse Tyson (NDT). He is an astrophysicist who runs the Hayden Planetarium at the Museum of Natural History in New York and frequents many TV shows and social media channels (*Curriculum Vitae: Neil deGrasse Tyson*). As a professional science communicator, he helps to establish the norms of science communication online, by setting the frame for what counts as science content and what does not. The way that he utilizes the different social media platforms also fosters a relationship with his audience that provides feedback on whether his communication is successful (Denia, 2020). This feedback from the audience influences what parts of his persona he shows online.

The way that NDT behaves online is a result of the established norms of science in society. NDT emphasizes parts of his persona, such as his “nerdiness,” to fit within the established image of science. However, NDT does not match all of the norms – as a black man, he counters long-standing stereotypes about who is and can be a scientist in the United States. It is possible that he navigates these stereotypes with specific strategies to validate and legitimize his image of a scientist within US culture so that he can achieve the perceived expertise that is necessary to be respected online.

While NDT has perceived expertise online, the breadth of this expertise is different from his academic expertise. He is a trained astrophysicist (*Curriculum Vitae: Neil deGrasse Tyson*), but his perceived expertise of science gives him room to speak on many adjacent science topics.

This perceived expertise is established through his matching of cultural norms and his audience helps negotiate the boundaries of his expertise. This perceived expertise establishes his social influence online in science communities.

NDT also presents himself as a science personality more generally. His own personal brand depends on him fulfilling that role and communicating science as part of the science communication community. However, NDT also markets the science he talks about in a distinct way by establishing his value as a translator of science and the value of science itself. The way he talks about science online, and specifically his Twitter feed, he establishes that science can answer any question, even silly ones. He also establishes that science is objective and a way to understand how the world around us works. NDT presents information online in two conflicting ways, the objective and clear-cut version of science and the entertaining, funny, and less serious version of science.

## **2.5 Summary and Research Questions**

For science influencers their identity online is comprised of the norms and social constructions present in these spaces that shape what is acceptable. Establishing identity as a science communicator online may stem from matching norms of the science community or drawing on different aspects of their identity. For someone like NDT this identity reflects both his brand and his persona online. This leads to the main research question: **Main RQ: How does NDT establish his identity as an influential science communicator on Twitter?**

In order to be trusted these online science personalities may shift the ways in which they show their persona to meet audience expectations. The identity that science influencers show in online spaces may draw on different aspects of their persona such as expertise, fame, and relatability. For NDT, as an influential science communicator, he may draw on different aspects

of his identity to achieve different goals. This leads to the first sub- research question: **RQ1: How does NDT draw on his expertise, fame, and relatability on Twitter?**

Over time the science influencers may draw on different aspects of their identity and in turn shift their personas. This shift could be a result of audience engagement, cultural changes, and world events that impacts the brand they have created. For this study of NDT, there were instances where trust in science rose and declined, and this could have an impact on the content and the persona he uses online. This leads to the second sub research question: **RQ 2: How do the ways in which NDT constructs his online persona on Twitter change over time?**

## CHAPTER 3. METHODS

This project is a qualitative critical discourse analysis of Neil DeGrasse Tyson's (NDT) Twitter (X) feed between March 2016 and March 2023. It examines ways in which NDT draws on different facets of his identity in his public communication to explore how these construct his persona as an influential science communicator, based on the ideas of social construction of science, identity, and branding. As a prominent science personality in the community, Neil DeGrasse Tyson provides a practical case study to understand how Twitter can be used to share science content. It addresses the over-arching research question: How does NDT establish his identity as an influential science communicator on Twitter?

### **3.1 Theoretical Framework of the Method**

Critical discourse analysis considers the social connection between language and the meaning that is gained from it (Fairclough, 2003, p. 3). By investigating the texts as artefacts, the intertextuality between them, and the interdiscursivity of how these texts fit into the broader social setting this form of analysis thinks critically about the culture and power that is implicated within these texts. (Quan-Haase & Sloan, 2022). This social analysis is done by looking at the production of the text, such as who the author is, the text itself, and the reception of the text it (Fairclough, 2003, pg 10). Production of a text focuses on the author's intentions and identity (Sakas, 2023). The analysis of the text itself primarily focuses on the language and meaning, but also what has been excluded from the texts itself, as these exclusions can also offer meaning (Fairclough, 2003, pg 10). Fairclough's approach specifically puts more emphasis on the production of the text rather than the reception of the text (Sakas, 2023). By focusing on the

author's production, one could understand the culture surrounding the information, the ideological implications embedded in what the author says, and the values they show (Fairclough, 2003, pg. 11). The primary interpretation comes from the interplay between these two, the production of the text and the contents of the text. In order to understand how a science personality could potentially shape the culture of science content on social media or how their representation of themselves online could shift science understanding, the best course of analysis is through the use of CDA.

In the past this method has been used to look at discourse on Twitter regarding COVID 19 (Jokanovic, 2023), climate change (Stewart, 2014), cultural events (Tian et al., 2021), corporate social responsibility (Kim et al., 2022), and Egyptian politics (Abdulmajeed & El-Ibiary, 2020). Specifically, this method has also been used to study beauty influencers (Dillard, 2021), Tik Tok influencers (Zhou Ting, 2021), YouTube influencers (Indrawati et al., 2023), and micro celebrities (Bakke, 2017). Since the current project analyzes the Twitter use of a famous science personality, NDT, this method offers specific insight into how culture and identity can shape production of content.

Lastly, this project seeks to investigate the social artifacts and institutional processes inherent in the production of NDT's content. NDT has a powerful position in both the science communication community by shaping the kinds of acceptable content and what science communication "normally" looks like. His content often also comments on anti-science rhetoric and thus goes up against the anti-science community as well as maintaining the powerful institution of science. NDT also has an identity that does not fit well within the "norms of science", and this may have influence over the content he chooses to produce or the way the content gets framed. These quandaries are best supported by the use of CDA, as a method to

investigate the social connections of the content, and thus the ideological, cultural and institutional powers that may be either influence or be an influence on the work he produces.

### **3.2 Data Collection**

The data analyzed for this project is a sample of 3,200 tweets posted by NDT between March 9, 2016 and March 30, 2023. These texts were chosen as the main analysis for this project because Twitter is one of NDT's main sources of public science engagement (*Curriculum Vitae: Neil deGrasse Tyson*). For the sample, 10% of tweets, or 320 tweets, were examined in depth, and grouped by time periods. Each time period corresponds to a specific historical period that may have impacted the tweets that NDT created, described below.

#### **3.2.1 Data Collection Procedures**

Data for this project was collected from the @neildegrassetyson Twitter profile using Twitter scraper, [twdoc.com](https://twdoc.com) on March 30<sup>th</sup>, 2023. All his posts between March 9<sup>th</sup>, 2016 and March 30<sup>th</sup>, 2023 were downloaded, with a total number of tweets of 3,200 tweets. The scraper collected the full tweet text, the time and date it was produced, the author of the tweet, and the number of likes, comments, retweets, and views, and a link of any other non-Twitter material the user added.

It is important to note that because these tweets were collected in March 2023, engagement metrics of later tweets in the dataset are likely smaller than those of earlier tweets, because less time passed between the original post and the collection of the data. Retweets, likes, and other engagements with tweets are most common shortly after a tweet is posted, but there are cases in which older tweets receive likes, retweets, etc. Therefore, tweets from several months or more before the data were collected are likely to have more engagement than those collected in January – March of 2023 in this dataset. Thus, tweets listed from 2023 may undercount

engagement and may therefore not be fully representative of what the actual engagement looked like in later months. According to Bae et al. (2014), the lifespan of a tweet receiving engagement from users is about 50 days before engagement stops. Thus, tweets in the sample from the first three months of 2023 were manually checked against current engagement numbers to correct for dated engagement from the original data collection.

The data points collected were organized into a spreadsheet for analysis (see Table 1) that includes the time, date, and content of each tweet, as well as whether or not a link or image was included. It also includes a count of retweets and likes for each post.

*Table 1. Tweet Dataset Structure*

<b>Column</b>	<b>Description</b>
created_at (UTC+1h)	Time of post
Text	Text of tweet
retweet_count	Number of retweets recorded
favorite_count	Number of times favorited recorded
in_reply_to	If post is a reply, the name of the user the post replies to
URL	URL of the post

### 3.2.2 Sample

In the full dataset, there were a total of 3200 tweets produced from March 9<sup>th</sup>, 2016 – March 30<sup>th</sup>, 2023. The scraper, [twdoc.com](http://twdoc.com) collected 3200 tweets from the date of scraping, therefore the data set is 3200 tweets from the date March 30<sup>th</sup>, 2023, and is why March 9<sup>th</sup> 2016 is the beginning of the data set. The largest number of tweets, 776, was created in 2020. Note that the fewer tweets produced in 2016 and in 2023 reflect the fact that these years did not include all 12 months (2016 data started in early March, and 2023 data ended on March 30<sup>th</sup>).

*Table 2. Number of tweets produced by NDT by year*

<b>Year</b>	<b>Count</b>
2016	299
2017	488

2018	306
2019	393
2020	776
2021	530
2022	339
2023	69

The sample for this project was a random sample of 10% of the tweets collected. To generate this sample, each tweet was assigned a number using the random number generator in Excel and then 10% was selected. The total number of selected tweets was 320. For this sample the time periods for this data set were broken down based on relevant periods of time in which NDT was producing content. Tweets were pulled in 10% percentages from each time period to examine him during this process of science information shifting online. Each tweet was individually analyzed and sorted into a spreadsheet, in the categories as listed below.

The first time period was the pre-President Trump era of Tweets. This selection of tweets is from the beginning of the data set, March 9<sup>th</sup>, 2016, to January 19<sup>th</sup>, 2017, the day before Trump was inaugurated into presidential office. This period is chosen to compare between the post and pre-Trump presidency and is characterized by record low trust in news media (Gallup, 2018), but levels of trust in science and scientists that were similar to previous decades (AP-NORC, 2023).

The second time period was that of a Trump presidency, which goes from his first day in office January 21<sup>st</sup>, 2020, to the beginning of the pandemic January 21<sup>st</sup>, 2020. This period of time is characterized by significant anti-science rhetoric from President Trump, especially on Twitter, and changes to the how the federal government conducted, used, and communicated scientific research, which had an impact on science understanding and belief (Webb & Kurtz,

2022). Trust in science, scientists, news media, and social media also declined during this time (Kennedy et al., 2022; Wang & Forman-Katz, 2024).

The third period was during the pandemic, which in this study is the first discussions of COVID -19 on Twitter, beginning January 21<sup>st</sup>, 2020 (Chen et al., 2020), to the end of the pandemic, which is March 7, 2022, just before the official indoor mask mandates ended in all US states (CDC, 2023). During this time, science content was shared rapidly online and mis- and disinformation spread widely (Nelson et al., 2020), and could have an impact on the type of content science communicators may choose to create. The public also reported rising frequency of engaging with science news (Saks & Tyson, 2022) and increased trust in science and scientists (Kennedy et al., 2022).

The fourth and final time period was post-pandemic, from the lifting of all mask mandates in the United States (Hawai’i was the final state to lift the mandate) on March 8<sup>th</sup>, 2022 (CDC, 2023), through the end of the collected data, March 30<sup>th</sup>, 2023. The time period is characterized by increased concerns about misinformation, declining trust in science and scientists, and declining trust in journalists (Kennedy et al., 2022).

*Table 3. Tweets by Time Period*

<b>Time Period</b>	<b>Description</b>	<b>Features</b>	<b>Random Sample</b>
Mar 9, 2016 – Jan 19, 2017	<b>Pre-Trump</b> (start of dataset to Trump inauguration)	319 tweets 79 links, 136 @s	32 Tweets
Jan 20, 2017 – Jan 20, 2020	<b>Trump Presidency</b> (start of term to COVID-19 mentions on Twitter)	1200 tweets 414 links, 581 @s	120 Tweets
Jan 21, 2020 – Mar 7, 2022	<b>Pandemic</b> (start of COVID mentions to end of mask mandate in all US states)	1290 tweets 537 links, 693 @s	130 Tweets
Mar 8, 2022 – Mar 30, 2023	<b>Post Pandemic</b> (after last US mask mandate lifted)	391 tweets 204 links, 92 @s	40 Tweets

### **3.3 Trustworthiness of the Proposed Study**

The trustworthiness of this proposed study depends on the five dimensions credibility, transferability, dependability, confirmability, and reflexivity (Korstjens & Moser, 2018). While recognizing that there are limitations to this study this section intends to provide validation for the quality of research produced in this project and indicate the value in studying this specific project.

#### **3.3.1 Credibility**

To ensure credibility, this project checked the coding processes and analyses with another researcher. This was done by having another researcher confirm that the definitions for the codes are reliable, and that the patterns seen in the categorization of the coding process were happening. I conducted in-depth analysis of the tweets by analyzing and reanalyzing until I had reached a sufficient depth and analysis. In addition, codes and analytical frameworks draw on existing literature on science communication, personas, and social media posts.

#### **3.3.2 Transferability**

The transferability of this study means that this analysis can be used to analyze other science influencers. Since this particular study focuses on understanding the aspects of identity that makes NDT influential, this analysis can be used for other online personalities to see if there are any commonalities between them and this case study. This project aims to provide insight on how science influencers perform online and create content and can be relevant for understanding science influencers in online spaces as a helpful framework for understanding them. This project focusses on online spaces and can be transferred to understanding other science personalities in these similar online spaces.

### **3.3.3 Dependability and Confirmability**

In order to make sure this study is dependable; I used the same process when analyzing the tweets produced by NDT by developing a codebook and using systematic processes to make sure that all parts were analyzed and recorded in the same way. I also used consistent language when analyzing the data so that the analysis for each tweet was interpreted consistently.

### **3.3.4 Reflexivity**

For reflexivity, it is important to recognize the biases that I as a researcher have regarding this topic of analysis. First, I am trained astrophysicist with a bachelor's degree and publications in astronomy. This impacts the way that I see and understand the tweets that NDT produces. I have training on the physics and astronomy he describes and that impacts the perceptions I have regarding the nuance and simplification he utilizes in those same tweets. Also, as a part of the astronomy community, I am sensitive to the critiques about NDT's work, such as his tendency to oversimplify science concepts and phenomena. I am also a strong advocate for science education and knowledge and inherently believe in an incredibly high value of science to society. This has impacted the specific topic I have chosen to research as well as how I feel about science content online, in its various forms. My particular views on science's importance may have an impact on how I interpret and critique these tweets and is important to reflect on.

## CHAPTER 4. ANALYTICAL APPROACH

In order to categorize each tweet for analysis, posts were organized based on three key characteristics indicated in the literature as central to credibility and trust of a communicator (Hoffman & Tan, 2015; Ohanian, 1990; Partanen, 2020). In order to understand the influence that NDT has as a science communicator online, scholarly and scientific expertise, notoriety and fame, and relatability and authenticity are key to him being seen as influential to his audience. These characteristics provided a starting point for qualitative analysis of the dataset. The tweets were identified as emphasizing NDT's 1) scholarly and scientific expertise; 2) relatability and authenticity; or 3) his notoriety and fame. These categories were initially developed as a rough categorization to assess the types of messages NDT uses and track how they differ across the time periods studied. Some tweets belonged to more than one classification, such as a tweet that includes both relatable humor and reference to scientific expertise. Therefore, these are not intended to be mutually exclusive, although analysis tracked which tweets belong to multiple categories and which have only one classification designation.

As this is a qualitative project, the classification process was approached as fluid and emerging rather than adhering to strict coding rules such as would be used for a quantitative content analysis. The analytical process included revisiting and revising these classifications and included adding new classifications or removing some initially conceptualized. External checks with another expert researcher provided confirmation of the rationales and analytical process. This was done by another expert researcher analyzing a subset of the data to identify that rationales and analysis are similar for confirmability of analysis.

Analysis began with the classification of tweets into the three identified groups, but other themes, codes, and patterns were identified throughout the analysis as they emerge. For example, humor is an important characteristic of NDT's communication style and was identified during analysis. Other themes such as anger, political statements, popular culture references, or comments on education may emerge as important in the data. The following sections describe each main classification with initial parameters for its conceptualization and examples.

#### **4.1 Scholarly and Scientific Expertise**

The first classification, scholarly and scientific expertise, are those claims that draw on or imply the relevance of NDT's scholarly expertise. These tweets rely on this expertise as an implied rationale for why the message should be trusted or paid attention to. Parameters are:

- Contains a scientific claim.
- Cites formal scientific research.

For an influencer, expertise is an important feature for the audience to assess the credibility of the information that one is producing. Online credibility is a perceived construct that relies on the expertise that the individual has. Expertise therefore is the "degree to which the endorser is perceived to have adequate knowledge, experience or skills" (AlFarraj et al., 2021) in order to be a trusted source on the content they are producing (AlFarraj et al., 2021). This means that one with expertise in a field has more plausibly true information regarding the topic than those who are not (Ohanian, 1990). In order for someone to have expertise one must have the adequate knowledge of the subject matter (AlFarraj et al., 2021; Masuda et al., 2022). For this analysis tweets categorized as fulfilling scholarly or scientific expertise reflect the notion of adequate knowledge or skills, based on understanding of the skills and knowledge NDT has. In this sense these are tweets that display a use of scientific or scholarly knowledge to communicate some idea, based on knowing that NDT has a PhD in Astrophysics and is a well-known science

communicator. This could look like using scientific explanation, or logic to deduce answers to a question. These tweets are ones that rely on NDT as a source for science claims or information since he has expertise in the field of science. For example, this tweet by NDT on January 4<sup>th</sup>, 2022, would fall into the scholarly or scientific expertise classification.

Solar flux scales as the square of the distance. If you do the math, Earth today receives about 6% more solar energy than in July. But we're also moving faster in our orbit. Which largely cancels out the net gain. That's why Winter is only 89 days long. Summer: 94 days <https://t.co/ha4oBScC4j>

In this example, NDT utilizes scientific knowledge that he earned from his training as an astrophysicist to explain how Earth receives more solar energy in July. This explanation relies on the scientific knowledge and expertise that NDT has earned, and thus understanding of his background contributes to trusting this claim.

Another example written on October 9<sup>th</sup>, 2022, is the following:

Late to the party here, but in this year's @TopGunMovie, @TomCruise's character Maverick ejects from a hypersonic plane at Mach 10.5, before it crashed. He survived with no injuries. At that air speed, his body would splatter like a chainmail glove swatting a worm. Just sayin'. <https://t.co/YP9IKVc8VS>

In this example, NDT relies on the knowledge of his expertise, astrophysics to communicate to the public how this movie may not be very accurate. Since he has an expertise in the field, the information and the logical flow of his explanation could potentially increase trust in the information that he presents as factual. While this tweet may be on the sillier end, NDT establishes his trustworthiness of this information because he has an expertise in this field that he relies on to make the scientific claim in the tweet.

## **4.2 Relatability and Authenticity**

Tweets are determined as relatable by the fact that they include an emotional tone, inclusion of features such as humor and non scientific jargon terms. These tweets are relatable

because these types of engagement can be used as a means to connect with audience members even if they do not hold similar levels of scientific expertise. Tweets were labeled as belonging to this classification when they do not contain a scientific claim but instead include other types of opinions or views of an issue or topic. These tweets communicate NDT's humanity, personality, or experiences and is generally of a more personal nature that an audience member can relate to. This is a broader, less specific classification than the expertise or fame classification, and contained a wide range of communication styles and content. The parameters are:

- Has personal opinions or views, shared experiences, or personal information.
- Has emotional appeals to audience members such as humor.

Relatability and authenticity are key aspects of influencer's source credibility online. For an influencer the authenticity of a person is reliant on the perceived honesty and credibility that their actions and statements have based on the limited interactions they have online (Singer et al., 2023). For one to be authentic one must have topic relevance, contextual information, and the ability to communicate meaning. Authenticity relies on truthfulness in context, such as transparent goals for the audience (Choi, 2018) and can look like consistency in content around their persona (Taniyev et al., 2022), or accuracy in the information being shared (Nunes et al., 2023). Authenticity in an online setting can also look like challenging the normative aspects of online communication and persona as interpreted by the audience members (Sobande, 2019). In this sense by sharing more personal content, or unexpected content which could be rejecting the norms of the platform, this could be seen as a more authentic expression of self online.

Relatability is the ability for the audience members to see themselves reflected in the content (Atiq et al., 2022). This could include similar experiences lived experiences (Pietri et al., 2021), similar thinking (Kaplan, 2023), or common cultural understanding (Kanai, 2019).

Relatability conceptually includes aspects outside of a celebrity persona as well, such as sharing

hobbies, family life, personal anecdotes, or emotional appeals such as humor (Taniyev et al., 2022), to help the audience see a “real” person rather than just a personality (Partanen, 2020). This content must also suit the interests of the audience members (Choi, 2018) and be seen as relatable to them since the norms of the community help to constrain what is acceptable content in that sphere (Partanen, 2020). Therefore, relatable and authentic content is a perception by the audience members that this personality is being transparent and engaging in similar experiences to the members of the audience. For example, this tweet created on December 19<sup>th</sup>, 2022:

Ice Cream, Big Ben, Leonardo Da Vinci, the Solstice, Stonehenge, & Aliens.  
A snapshot of I was doing six months ago.  
24 hours in 20 minutes: #StarTalk takes London.  
<https://t.co/Jv16kXSGry>

This tweet could be seen as relatable because it speaks on going on a trip, which an audience member could relate to, as they may have also taken a trip, potentially even to that same location. This link included is also a vlog, which is authentic in the sense that it is perceived to be a genuine representation of what was happening that day. This can also be seen as relatable because it matches the interests of the audience, by referencing science concepts but not drawing on his science expertise, that members may also be interested in. Another example from April 5<sup>th</sup>, 2022 is:

@beatmurda The previews have me greatly worried. But It’s nonetheless on my list.  
Stay tuned.

This tweet could be seen as relatable in the sense that this is an experience that other audience members could relate to, such as seeing previews for something but not being sure if it will be good. This does not talk about science content or reference his own fame in any way. This tweet is also a more personal expression rather than reference to his science personality online, which makes this content more authentic, since it’s a personal opinion rather than something justified by either his expertise or fame.

### 4.3 Notoriety and Fame

This classification is conceptualized as referencing NDT's fame via his published or distributed work, such as his books, public interviews, television appearances and shows, movie appearances, etc. This classification includes mention of specific scientific claims, humor, or other types of comments, but does not always. The parameters for this classification are:

- Contains promotion of content that he has produced, such as a book, new show, or podcast that does reference his science expertise.
- Contains content that references his own fame or the fact that he has a reputation in culture.

Notoriety and fame for an influencer is the aspects of recognizability and being popular in culture (Rojek, 2001). In this sense a tweet that is of the classification of notoriety and fame would be one the references one's own fame or recognizability (Brooks et al., 2021; Djafarova & Trofimenko, 2019; Page, 2012; Ruiz-Gomez, 2019). Notoriety is tweets that involve some kind of recognition of the work that NDT does; times where he self-promotes his own work in other spheres or his appearances on shows fall within this classification because he references his recognizability on these other mediums, and the fact that he showed up on these other mediums. In these instances, he references the fact that his being talked about or his popularity on these other mediums. Self-promotion falls under this because often times its directing to other popular work that he has done, and he uses the audience he has on Twitter to further make it popular. For example, this tweet from October 8<sup>th</sup>, 2022,

This weekend "Starry Messenger: Cosmic Perspectives on Civilization"; debut's at #3 on the NYTimes Bestseller list.

Thanks to all who care about what I think, what I say, & what I write. My motivation is, and will always be, to serve your cosmic curiosity

<https://t.co/w4IyMHPwka> <https://t.co/xLRINAy22b>

In this particular tweet this fits into the classification of notoriety and fame because he is referencing his own work, the book he just wrote. In this sense he notes that he is popular, by

talking about being on the best sellers list as well as the fact that his audience is interested in what he says and does. One of the links directs you to his website where you see the book listed, as well as other notable things that he has done. In essence this is a recognition of his popularity, which may lend to his credibility. Another example from July 31<sup>st</sup>, 2022, is:

Nichelle Nichols - Live Long & Prosper

December 1932 - July 2022

A must-listen interview from the @StarTalkRadio Archives. [Audio: 42m]

<https://t.co/LUOujfLj77> <https://t.co/Ir8vUUCZLX>

Similarly, this work also references another medium of work that he is on, which is the podcast that he produces and hosts, Star Talk. He references the fact that he has the chance to speak with another famous person as well as the fact that this is a popular episode of the show. This is also a reference to his popularity and the notoriety he has.

## CHAPTER 5. DISCUSSION: TWEET PERSONAS

### 5.1 Personas Overview

From March 9<sup>th</sup>, 2016 – March 30<sup>th</sup>, 2023, NDT produced a total of 3,200 tweets. This study analyzed 10% of that sample, or 320 tweets. During the analysis, seven distinct personas emerged from the sample. It is important to note that these categorizations are not mutually exclusive, as each tweet may embody multiple personas simultaneously.

*Table 4. Personas*

<b>Persona</b>	<b>Pre Trump</b>	<b>Trump Presidency</b>	<b>Pandemic</b>	<b>Post pandemic</b>
Science communicator	15.63%	5.84%	15.38%	12.50%
Nerd	21.88%	23.34%	10.77%	10%
Average bloke	18.75%	18.34%	13.08%	5%
Philosopher	21.88%	14.17%	13.08%	27.50%
Carl Sagan Wannabe	21.88%	25%	23.85%	30%
Pedantic	15.63%	25%	27.69%	7.50%
Influencer	25%	28.33%	36.93%	30%
Total Tweets	32	120	130	40

Over the course of the time period, the use rate of the personas exhibited notable changes. The Science communicator persona initially accounted for 15.63% during the Pre-Trump era but decreased to 5.84% during the Trump presidency. This persona then saw a resurgence during the pandemic, rising to 15.38%, before slightly declining to 12.50% in the post-pandemic period. Similarly, the Nerd persona began at 21.88% during the Pre-Trump era and increased to 23.34% during the Trump presidency. However, its presence diminished significantly during the pandemic, dropping to 10.77%, and further decreased to 10% in the post-pandemic period. The average bloke persona was at 18.75% during the pre-trump time period. During the trump

presidency it stayed relatively the same at 18.34%. During the pandemic it decreased to 13.08% and decreased again during the post pandemic time period to 5%. The Average bloke persona represented 18.75% during the Pre-Trump period and remained relatively stable at 18.34% during the Trump presidency. However, its presence declined during the pandemic, dropping to 13.08%, and further decreased in the post-pandemic period to 5%. The Philosopher persona decreased from 21.88% in the Pre-Trump period to 14.17% during the Trump presidency but then saw a significant increase to 27.50% in the post-pandemic period. The Carl Sagan Wannabe persona remained relatively stable, accounting for 21.88% during the Pre-Trump period and 25% during the Trump presidency. However, it experienced a peak during the pandemic (23.85%) and continued to rise to 30% post-pandemic, indicating a growing interest in science-related discussions. The Pedantic persona increased from 15.63% in the Pre-Trump period to 25% during the Trump presidency, reaching its highest point at 27.69% during the pandemic, before sharply declining to 7.50% in the post-pandemic period. Finally, the Influencer persona demonstrated consistent growth, rising from 25% in the Pre-Trump period to 28.33% during the Trump presidency, reaching a peak of 36.93% during the pandemic, and then slightly decreasing to 30% post-pandemic. NDT adopts a variety of personas in the tweets he posts on Twitter, with each persona reflecting his relationship to societal norms, culture, and his identity as both a scientist and a science communicator. This section identifies and analyzes the major personas he adopts.

## **5.2 Science Communicator Persona**

Drawing on his scientific expertise, NDT relies on a persona of science communicator. This persona focuses on the dissemination of science content to an audience who may not have previous knowledge of science in a logical and scientific manner (Niskanen et al., 2018; Paul,

2014). Tweets within this category typically involve explanations, whether clarifying a scientific term or concept, or offering scientific insights to help explain a phenomenon in the world. These tweets are generally objective and straightforward, though NDT occasionally incorporates humor to enhance accessibility. For example, on March 20th, 2021, he wrote:

Sun tables for today show slightly more than 12 hours of daylight.  
Light bends on entering Earth's atmosphere from space. The sunrise or sunset you see is the lagged location of the Sun's refracted light, and not the Sun itself, adding unearned minutes of daylight – daily.

In this tweet, NDT explains how the times of sunrise and sunset vary by location. He adopts an objective tone, primarily describing the phenomenon for an audience with little prior knowledge of how sunsets work physically. His explanation draws on traditional portrayals of scientists by emphasizing facts and logic, establishing credibility through objective reasoning. The inclusion of numbers, statistics, and other factual data creates an image of impartiality and objectivity, which are key components of traditional scientific discourse. When he draws on his scientific expertise, this approach is useful for maintaining credibility; his objectivity signals that his science is unbiased and trustworthy. By aligning with these traditional scientific portrayals, NDT is communicating his credibility, thereby enhancing his influence as a trusted scientific figure in the online space.

When comparing to the pre-Trump time period, or post Trump time period however, the use of this persona decreased, particularly during the period when science faced significant scrutiny, such as during the Trump presidency. This shift in his approach coincides with a tumultuous time for science in the media, when scientific authorities were frequently attacked, and the validity of scientific knowledge was often questioned. Despite this, while NDT continues to present science in the traditional, fact-based manner of a scientist, he does not directly defend

science in the face of these attacks. In the sample analyzed, NDT refrains from engaging with conspiracy theories or other non-scientific agendas. This absence of direct confrontation could be a strategic decision to avoid controversy or "cancellation," but it might also suggest a lack of engagement with the broader cultural debates surrounding science during this period. Instead, his focus appears to be on maintaining his own portrayal as a credible scientist, while avoiding deeper involvement in the political or ideological battlegrounds over science.

One particular way in which he reinforces and displays this is through the use of his science humor. For example, on August 17<sup>th</sup> 2022, NDT tweeted:

Chapter: EARTH & MOON If light from a full Moon converts your genetic profile into a wild canine, consider that moonlight is simply reflected sunlight. So, if the Moon turns you into a werewolf at night, then so should the Sun in the daytime.  
<https://t.co/hMOhOcWGoK>

In this tweet, NDT relies on scientific information to craft a joke. This form of humor targets an audience familiar with the science he references, using his expertise to create a piece of content that is both informative and humorous. By drawing on his scientific knowledge to make jokes, NDT draws on his credibility within the scientific community, as those with a background in science can understand both the content and the humor. This reinforces his status as an expert and aligns with his brand as a science communicator. Furthermore, the humor he uses can serve as a bridge to the public (Patterson, 2024), even if the audience member does not fully understand the scientific details of the joke. Although some followers might not immediately understand the humor, it could encourage them to explore the science further, thereby sparking interest and learning. This represents an innovative approach to science education, where humor becomes a gateway to engagement and curiosity.

However, over time, this type of science-based humor diminishes, along with the frequency of science content in his posts. A possible explanation for this shift is that, in the face

of increased scrutiny and challenges to science, NDT may be adopting a protective strategy. His use of science humor evolves from a confident, somewhat assertive way of demonstrating his expertise to a more subtle form of humor, lighthearted quips and simple, silly science facts. This shift could be a way to protect his status and influence as a celebrity. During the Trump presidency, when science has been increasingly under attack, he aligns his content with the prevailing media norms that prioritize entertainment and personal branding over scientific content. By doing so, his posts can remain relevant in the social media environment without making him a target in the polarized discourse surrounding science.

### **5.3 Nerd Persona**

The nerd persona focuses on enjoying learning, especially math and science, possessing a large amount of esoteric knowledge, and includes being an avid media consumer and collector of items related to knowledge and sci fi (Boynton, n.d.; Kendall, 1999). Tweets in this persona often reflect an enthusiastic appreciation for "nerd" culture, featuring science jokes, nerdy references, and a celebratory tone about intellectual pursuits. This persona helps NDT attempt to connect with audiences who identify with the broader "nerd" community, further solidifying his position as a relatable figure for those who share these interests. His frequent use of popular culture references in this context could be an attempt to make his content more accessible and engaging for a wider audience. For example, on May 4th, 2021, he tweeted:

On this #StarWarsDay, I offer a Baby Yoda'fied versions of :  
'The good thing about science is that it's true whether or not you believe in it.'  
Shirt conceived & designed by fans. Approved by me. After fees to the artist, proceeds go to educational orgs.

This tweet references the iconic science fiction character Yoda from the *Star Wars* franchise. By expressing his enthusiasm for nerd memorabilia, NDT participates in the cultural joy surrounding *Star Wars* and nerd culture at large. In doing so, he helps make himself relatable to

others who share an appreciation for science and science fiction. NDT leverages his credibility as a scientist to share science-related information, while simultaneously using his nerd persona to express a genuine love for science content that may not resonate as strongly in his more formal scientific persona.

An important aspect of the nerd persona is the connection it fosters with the nerd community. NDT's use of this persona is rooted in his own emotional investment in the content that is celebrated within this community. His credibility as a member of this group—whether through his personal enjoyment of science fiction or his awareness of its cultural significance—is part of his attempts to connect with his audience. If NDT were not genuinely involved in or at least aware of the content that defines the nerd community, this persona would not be as effective in building rapport with his followers. NDT draws on inside jokes and humor from the nerd community, such as the idea of being "Baby Yodified" and celebrating *Star Wars* Day. This example demonstrates his awareness of popular trends within the subculture, and his use of these references helps to solidify his credibility as a true "nerd." By participating in these cultural moments, NDT shows that he understands the nuances of the nerd community, which is crucial for building trust with its members. This trust is further reinforced by his active engagement in the cultural practices that define the group.

For members of the nerd community, NDT's ability to perform these "inside" actions is an attempt to strengthen his connection with them. His participation validates his membership, deepening his credibility as both a scientist and a culturally aware member of the nerd subculture. To outsiders, this could further reinforce his trustworthiness as a scientist, as science is often associated with nerd culture. His engagement is an way to try to foster trust and attempt to build an emotional connection with his audience. This emotional bond is important for NDT,

as it helps solidify his role as both a credible scientist and a relatable figure within the community.

#### **5.4 Average Bloke Persona**

Another persona NDT adopts is the average bloke, which is a way for him to try to relate to broader audiences than the nerd community or science communities. This persona positions NDT as someone with common experiences and interests—such as growing older, traveling, or enjoying sports—that resonate with a wide range of people (Ki et al., 2020). For example, on October 5th, 2018, he posted:

#IKnewIWasOld when the urge to go exercise was easily overrun by the competing urge to take a nap.

The average bloke persona is particularly useful for NDT in attempting to connect with audiences who may not identify with the more specialized scientist or nerd aspects of his identity. By adopting the "average bloke" persona, he broadens the range of people he may be able to relate to, making his content more accessible to a wider audience. However, there is a potential downside to this approach: it could lead to a backfire effect among those who primarily know him as a science communicator. By using a more playful and less serious persona, NDT risks undermining his scientific authority, as it contrasts with the more authoritative, knowledgeable image he cultivates in his science-focused content. In this sense, the "average bloke" persona acts as a foil to his science persona, which could dilute his credibility among certain audiences.

On the other hand, adopting this persona adds complexity to NDT's online presence and provides a glimpse into his life beyond his role as a scientist. It humanizes him as a celebrity figure and challenges the narrow, often rigid portrayals of scientists in the media. This helps to

emphasize that scientists have lives, emotions, and experiences that extend beyond their professional expertise. By presenting himself as multifaceted, NDT offers a sense of "realness" and authenticity that may make him seem more relatable and trustworthy. This portrayal of depth not only makes him more approachable but could potentially increase the credibility of his scientific messages, as audiences are more likely to trust someone, they feel they know on a personal level.

One way NDT may reinforce his "average guy" persona is through the use of lighthearted humor, which could appeal to non-scientific audiences. For example, this tweet from June 13<sup>th</sup>, 2021, does not require any prior scientific knowledge to understand or appreciate the joke

The great Tumbleweed migration of 2021. They must know something we don't.  
<https://t.co/uwYX8gZT4m>

By making content that could be seen as broadly accessible and humorous, NDT further solidifies his appeal across diverse groups, including those who may not otherwise engage with science content. The humor in these posts offers a break from the more technical or serious aspects of his other personas, providing an enjoyable entry point for people who may be new to or less interested in science.

In this way, NDT's use of non-science humor could be a way for him to connect with both his science and non-science audiences. By crafting jokes that are accessible to those without a scientific background, he ensures that his content could be engaging for a broader range of followers. At the same time, this approach could strengthen his credibility and potentially help foster a sense of belonging in both the scientific and non-scientific communities. By creating content that resonates with both groups, he could increase his relatability and broaden his appeal.

Some of NDT's tweets effectively employ a dual-targeting strategy, aiming to engage both audiences simultaneously. This strategy could be a way for him to bridge the gap between

his scientific followers and those who may not have a deep understanding of science but still enjoy his content. In this case, the tweet could appeal to both audiences by blending humor with accessible language, ensuring that both groups feel included and engaged. For example, on September 18<sup>th</sup> 2022, NDT tweeted:

Mathematically, most people are not "Suckers."  
Worldwide, about four people are born every second. If a sucker is born every minute (as legend declares) then only one in 240 people is a sucker. Just sayin'

Although this tweet incorporates math and statistics to make the joke, it does not require expert knowledge in those fields to understand or appreciate the humor. This could make the joke accessible to both individuals with and without statistical expertise, allowing NDT to engage a wider audience with the same content.

NDT's lighthearted humor could also serve as a strategic shift in tone, moving toward a style that is more universally understandable. This form of humor aligns with the expectations of online media, making content more digestible and less likely to alienate or offend followers. By adopting a more inclusive and playful tone, NDT could reduce the potential for controversy, helping to maintain a positive image while broadening his appeal. This shift in tone is not only a method he could employ for him to connect with a diverse audience, but also a method for attempting to increase his credibility and trustworthiness. Humor, when used effectively, fosters connection and builds trust, making it a powerful tool for NDT to try to reinforce his standing both as a scientist and as a public figure.

## **5.5 Philosopher Persona**

In addition to his more lighthearted personas, NDT also uses a philosopher persona. Through this persona, he engages in discussions about humanity, drawing on logic, rhetorical techniques, and ethical reasoning (Hunter, 2007). By using these philosophical tools, NDT

expands the scope of his commentary beyond strictly scientific matters, offering reflections on broader issues related to human behavior, society, and culture. While this persona steps outside the boundaries of his scientific expertise, it provides him with a platform to attempt to engage with a wider range of topics, giving him greater flexibility in his communication. This philosophical approach allows him to address complex, societal questions from a perspective that goes beyond empirical science, further diversifying his public persona. For example, NDT's post on January 2<sup>nd</sup>, 2023:

The brush strokes with which we paint and characterize the views of adversaries tend to be broad and without nuance, leaving us susceptible to bigotry and prejudice.  
(Starry Messenger: Cosmic Perspectives on Civilization; Chapter 4: Conflict & Resolution)

The philosopher persona allows NDT to share his moral insights to his followers without directly telling them how to live their lives. By adopting the academic tone of a philosopher and drawing conclusions through logic and reason, he conveys a sense of wisdom about how the world should operate, based on his scientific expertise and understanding. A trained scientist is typically cautious about offering opinions that aren't grounded in empirical data. However, as an online personality many people turn to NDT not just for scientific facts but also for his perspective on broader societal issues. The philosopher persona provides a platform for NDT to share his opinions while still maintaining a sense of academic rigor.

This approach allows NDT to question conventional ideas and societal norms, drawing on his expertise as a scientist to offer new perspectives or challenge authority. His reasoning, though grounded in logic, often critiques existing structures or highlights the need for change around policy, while still operating within the boundaries of his academic training. By using this persona, he engages in discussions outside the realm of pure science without undermining his own credibility as a scholar. This expands the range of topics he can address, while still

maintaining authority by relying on the academic framework he's established as a scientist. In this way, he can speak on a variety of issues without feeling as if he was directly challenging his scientific expertise.

## **5.6 Carl Sagan Wannabe Persona**

Another persona aspect that emerged was the Carl Sagan Wannabe persona. This persona draws on the legacy of Carl Sagan, the famous astrophysicist and science communicator, who was widely known in the 80s and 90s for promoting science to the public through inspiration and a deep appreciation for the wonders of the universe. Sagan's approach, particularly through his television series *COSMOS* (Sorensen, 2013), relied on evocative imagery—such as stunning images from NASA—and beautiful descriptions of astronomical phenomena to inspire awe and curiosity in his audience. Sagan not only communicated scientific concepts but also used his position to question the role and value that governments and other institutions placed on science, making logical arguments for the importance of science in understanding the world and advocating for its funding and support.

NDT's "Carl Sagan Wannabe" persona parallels this approach, emphasizing the value of science to society through inspiring language and imagery. Like Sagan, NDT uses his platform as a way to communicate the wonder of science, while attempting to foster a greater societal appreciation for it. This persona allows NDT to convey the importance of science not only as a means of advancing knowledge but also as a way to engage with broader cultural and philosophical questions about the world. By tapping into this legacy, NDT attempts to inspire his audience, much as Sagan did, and promote the value of science through a sense of awe and intellectual curiosity. For example, on August 23<sup>rd</sup>, 2020, NDT wrote:

Ever look up at night and feel small? Don't. Instead feel large. Atoms in our bodies trace to the remnants of exploded stars. We are Stardust. We are alive in the universe. And the universe is alive within us.

These tweets frame science as a source of inspiration and awe, which can be a powerful tool for generating public interest in science and influencing policy decisions. By presenting science as fascinating and emotionally engaging, NDT taps into the potential to garner support for scientific initiatives, particularly organizations like NASA. When the public finds science compelling, there is a greater likelihood that governmental bodies and regulators will feel obligated to fund these programs in response to public demand. This approach is especially important for ensuring that science remains relevant in both cultural and political spheres.

Furthermore, the persona NDT adopts helps science stay culturally relevant by blurring the lines between education and entertainment. By packaging scientific content in an engaging format, such as visually captivating graphics or complex, and entertaining shows like *COSMOS*, NDT's tweets create an experience where learning about science is as much about enjoyment as it is about intellectual engagement. This fusion of education and entertainment is key to maintaining public interest in science. Without this cultural relevance, scientific projects, such as launching a probe into the Sun, could be seen as esoteric and disconnected from human life, making it more difficult for policymakers to justify funding them. Astronomy, for instance, is often pursued more for the joy and curiosity it fosters than for its direct practical benefits to humanity, making it easy to overlook in favor of more immediately applicable research, like biomedical studies.

However, by fostering public interest and emotional investment in science, NDT's approach helps to ensure that science continues, even when its practical applications are not immediately clear. The value given to science through entertainment increases societal

investment in the field, encouraging the next generation of scientists and helping to demonstrate to policymakers why science deserves funding and support. The Carl Sagan Wannabe persona is an attempt to advocate for the broader value of science in society, highlighting the joy it can bring and the cultural enrichment it provides. By portraying science in an accessible and emotionally engaging way, NDT helps ascribe value to science in the public consciousness, which in turn helps to sustain the field for future generations.

One of the key aspects of NDT's tweets is the joy and enthusiasm he conveys for science and knowledge. This emotional connection to science, along with his evident excitement for learning and discovery, stands in contrast to more traditional portrayals of science, which are often depicted as objective, impersonal, and devoid of emotional engagement. In this way, NDT challenges conventional representations of science by infusing it with personal passion and excitement, which helps humanize the field and may make it more relatable to a wider audience. For example, on February 10<sup>th</sup>, 2021, NDT tweeted:

Congratulations to China for arriving at the planet Mars today, with their Tianwen-1 ("Heavenly Questions") mission.  
It contains an Orbiter as well as a Lander/Rover combo that touches down in May.  
<https://t.co/MrBfeT7Eda>

In this tweet, NDT expresses his excitement and joy over the successful landing of a rover on Mars, even congratulating the country responsible for the mission. This type of emotional engagement contrasts with his science communicator persona, which is grounded in objectivity and detachment from the emotional aspects of scientific discoveries. However, NDT is able to express the personal joy and enthusiasm that such a momentous event brings to him. This emotional connection may make him more relatable to his audience, which could help to ignite their own interest and excitement in science. By blending his scientific expertise with genuine

passion, he creates a potentially more accessible and engaging form of science communication that encourages others to share in his enthusiasm.

## **5.7 Pedantic Persona**

Another persona aspect that NDT draws on is the pedantic persona, which addresses accuracy of information and expressed healthy skepticism. This persona often manifests in his corrections of minor details or the correction of seemingly trivial information (Paul, 2014). A significant aspect of NDT's online presence is his ability to bring this pedantic nature to cultural content, using it as a form of entertainment in itself. By inserting scientific knowledge into discussions of popular culture or correcting small inaccuracies, he not only showcases his expertise but also establishes his authority as a scientist. This attention to detail demonstrates his scholarly approach, allowing him to critique cultural phenomena with the same level of rigor he applies to scientific topics. The pedantic persona also enables NDT to assert his expertise by pointing out nuances and details that only a true expert would notice, attempting to reinforce his credibility in both the scientific and popular realms. For example, NDT tweeted on December 24<sup>th</sup> 2022:

Just to affirm that whoever says Happy Holidays instead of Merry Christmas, is using a word that etymologically derives from "Holy Days".

One important way NDT uses the pedantic persona to attempt to increase his credibility and influence is through the use of sarcastic humor. However, as his prominence and influence grew, sarcastic remarks may have become a danger to his relevance in media. If directed at someone more powerful than him, sarcasm could backfire and be used against him, potentially damaging his standing in the media. This is especially relevant in the context of the increased hostility toward science and media during certain periods. The decline in sarcastic humor could

potentially reflect a strategic shift on NDT's part to reduce the risk of being "canceled," a situation that would harm his reputation.

NDT's use of various types of humor likely serves a dual purpose: it is an attempt to engage with different segments of his audience while ensuring that each group remains interested in his content. Humor is a potent tool for relatability, and by adapting his comedic style, NDT can connect with a broader audience. However, the reduction in more hostile forms of humor, such as sarcasm, suggests that he could be distancing himself from the more controversial elements of his persona. This shift could be seen as an effort to avoid alienating potential followers and to mitigate the risks of cultivating a negative or combative public image. In an era where media dynamics are ever-changing and volatile, reducing the use of sarcasm may be a way for NDT to safeguard his reputation and remain a trusted figure.

By scaling back on sarcasm, NDT could be maneuvering to protect his reputation and preserve his influence in a combative cultural landscape. This decrease in combative humor may be a strategic move to maintain his position of prestige and power by minimizing potential conflicts, particularly with those who hold more influence than him. In essence, his reduction in sarcastic humor may be a way to keep his public persona more palatable to broader audiences, which in turn could help him maintain his visibility and status.

## **5.8 Influencer Persona**

Lastly, NDT also embraces an influencer persona in his content. In these posts, he draws on his celebrity status and commercial success, leveraging these aspects to maintain his relevance in the online space. These posts often focus on engaging with his audience in a more personal, promotional way, highlighting his ongoing projects. This persona reveals the main features of being a celebrity within the social media environment, where self-promotion and

staying visible are crucial for maintaining a relevance in the online environment (Chayka, 2024). By adopting this influencer persona, NDT relies on his fame to continue to shape his narrative and expand his reach, allowing the chance to become an important figure in both the science community and the broader public sphere. For example, on March 17<sup>th</sup> 2022, he promoted a video of himself:

From the Archives: Between scenes, in socks on the slippery smooth Green-Screen that would become the Cosmic Calendar. "Cosmos A Spacetime Odyssey" (2014).  
[Video: 10 sec] <https://t.co/KSM8eQhLd4>

The video, where NDT is seen slipping around in socks, serves as a humorous and lighthearted way to attempt to engage his audience and encourage them to explore his other content. This type of persona is vital for his success in the online media environment, where relatability and engagement are key to maintaining an active and loyal following. By incorporating humor and showing a more human side, NDT not only enhances his brand but also makes his science content seem more approachable. His ability to connect with his audience on a personal level helps to increase his potential authenticity, which in turn could strengthen his trust and credibility.

In order to effectively promote the "joy of science," NDT needs to demonstrate that his content is both accessible and enjoyable. This lighter, more relatable persona could be a way to draw people in, ensuring that his more serious scientific messages are received with interest and enthusiasm. By balancing humor with science, he may make his content feel both engaging and worth interacting with, which further solidifies his brand and the value of science within society and culture.

This persona is useful for his success because it may reinforce the trust and credibility he has built with the public, extending beyond his scientific expertise and credentials. While his

technical knowledge is undoubtedly important, it is his attempts to foster a sense of relatability and authenticity that may make his ideas resonate with a broader audience. By engaging with people on an emotional and personal level, NDT attempts to build trust, making it possible that people are not only willing to listen to his messages but also embrace and support the ideas he promotes.

## CHAPTER 6. DISCUSSION: SCIENCE AESTHETIC

### 6.1 Expertise Overview

The total number of tweets analyzed in the sample was 320, covering the period from March 9th, 2016, to March 30th, 2023. Within this sample, three specific types of expertise emerged that NDT relied on: scientific and scholarly, relatability and authenticity, and notoriety and fame—each of which are essential for effective online communication. Over time, the prominence of these types of expertise shifted depending on the period in which the tweets were created. It is important to note that these categorizations are not mutually exclusive, as each tweet may draw on multiple types of expertise simultaneously.

*Table 5. Expertise Tweet Analysis*

<b>Expertise</b>	<b>Pre Trump</b>	<b>Trump Presidency</b>	<b>Pandemic</b>	<b>Post Pandemic</b>
<b>Scientific and Scholarly</b>	31.25%	20%	22%	22%
<b>Relatability and Authenticity</b>	75%	83.34 %	84.62 %	62%
<b>Notoriety and Fame</b>	25%	20%	26.9%	42 %
<b>Total tweets</b>	32	120	130	40

During the Pre-Trump era, or before the Trump presidency, the type of expertise NDT relied on most was relatability and authenticity, which comprised 75% of the tweets in that time frame. Scientific and scholarly tweets accounted for 31.25%, while notoriety and fame contributed to 25% of the tweets. However, during the Trump presidency, scientific and scholarly tweets dropped to 20%, and notoriety and fame also decreased to 20%. In contrast, relatability and authenticity rose significantly, making up 83.34% of the sample. During the pandemic period, notoriety and fame increased to 26.9%, and scientific and scholarly tweets rose to 22%. However, relatability and authenticity remained relatively unchanged at 84.62%. In the

post-pandemic period, scientific and scholarly tweets remained constant at 22%, but relatability and authenticity decreased to 62%, while notoriety and fame increased substantially to 42%.

## **6.2 Traditional Science narratives vs cultural science narratives**

While NDT often embodies the joy and enthusiasm for science-related topics, this can sometimes conflict with traditional portrayals of science. Science, as a discipline, relies heavily on objectivity and a lack of emotional connection, as emotions can introduce bias and undermine credibility. The ideal of scientific neutrality stands in contrast to the emotional engagement NDT brings to his science communication. However, this framing of science, where emotion and excitement are part of the conversation, has the power to inspire and engage audiences. By showcasing the wonder and joy that science can offer, NDT attempts to make science both entertaining and accessible, helping to spark and sustain interest in scientific content. His approach provides an entry point for those who may not have had access to or interest in science previously, particularly for audiences who might not feel they belong in the world of science due to its historical association with elite and academic circles.

NDT's attempts to make science feel accessible and relatable bridges the gap between these traditionally exclusive spheres and a broader public. However, this approach also contributes to a version of science that differs significantly from the nuanced, complex, and in-depth understanding that academic scientists aim to achieve. By focusing on enthusiasm and emotional connection, NDT's tweets emphasizes science as something to be enjoyed and engaged with on a personal level, rather than as an objective, impersonal field of study. This shift challenges traditional portrayals, which often prioritize factual delivery.

Another way NDT challenges conventional narratives about science is through the infusion of personal opinions, emotions, and humor into his online persona. By drawing on the

science communicator, he emphasizes his own joy and fascination with science, or by using the Carl Sagan Wannabe persona, he connects with audiences through shared wonder. Through sarcastic humor and the pedantic persona, NDT brings his emotions to the forefront, showcasing his personality alongside his scientific expertise. Traditionally, scientists are expected to remain neutral, focusing strictly on facts and avoiding personal bias. However, NDT's approach allows him to connect with his audience on a deeper, and potentially more relatable level, challenging the perception that scientists are detached or emotionless.

While this strategy helps humanize NDT and foster trust, it also has the potential to undermine his scientific rigor and credibility. By displaying a more casual or playful side, he risks detracting from the authoritative "scientist" persona that relies on expertise and objectivity. Nonetheless, his ability to balance these different personas allows him to attempt to make science more relatable and accessible, giving his audience a fuller picture of who he is and potentially increasing their likelihood of trusting him. The average bloke persona, in particular, helps NDT bridge the gap between traditional science communicators and the broader public, showing that scientists are not just figures of intellectual authority but also people with shared, everyday experiences.

This shift away from the traditional, more stoic image of scientists is also notable in NDT's ability to attempt to make personal connections with his audience. Traditional scientists may avoid sharing personal anecdotes or aspects of their everyday life for fear of undermining their authority. However, NDT embraces this relatability by using humor and casual reflections on topics like aging or sports to present a more humanized version of himself. This humanization, while sometimes at odds with traditional norms of scientific discourse, helps break down barriers and make science feel more accessible and less intimidating.

Moreover, NDT's identity as a Black scientist further complicates the traditional narratives surrounding science communication. Historically, science has been dominated by white, male figures, who are often seen as the primary authorities in the field. NDT, by contrast, does not fit this mold, yet he successfully leverages other strategies to position himself as a "man of science." He draws on the pedantic and philosopher personas to speak in the authoritative language of science and frequently wears astronomy-themed clothing to visually connect himself to the field. By aligning himself with established figures like Carl Sagan, who achieved both scientific and public credibility, NDT strengthens his own position as a trusted science communicator.

However, his racial identity challenges conventional expectations, and NDT must actively navigate these norms to earn the respect and credibility typically afforded to white scientists. In doing so, he strategically conforms to established norms of the scientific community, adopting the same academic rigor and authority, while also attempting to influence the narrative around science to be more inclusive and accessible. His representation of science attempt to present it as a set of facts but as a vibrant and valuable part of culture that everyone can engage with. Through these nuanced strategies, NDT both tries to reinforce and redefine the public's perception of scientific expertise, by trying to make it more relatable, inclusive, and relevant in a rapidly changing media landscape.

### **6.3 Scientific Representation**

One particularly important facet of how NDT presents both himself and science online is the way his tweets depict and represent science. NDT infuses his scientific content with other aspects of his persona, whether that's showing science as a part of who he is, exploring philosophical concepts, or imbuing moral reflections into the scientific discussions he shares. By

doing so, NDT's tweets could potentially shift the definition of science and broaden what it means to be a scientist. His approach challenges the conventional, narrow portrayal of scientists as purely objective experts and instead presents a more humanized, multifaceted view of the role science plays in society.

A key aspect of NDT's depiction of science is that it is only one part of his larger persona. While he is undeniably a scientist, he emphasizes that his identity is more complex than just that expertise. He portrays himself as someone who not only engages in science but also enjoys humor, connects with others through the average bloke persona, and shares his enthusiasm for movies, pop culture, and everyday life. His identity is built on a blend of interests and personal traits that go far beyond his scientific work, helping to establish a sense of humanity and relatability. This broader persona is crucial for his success as an online personality, allowing him to potentially connect with audiences on a personal level. While a traditional scientist may gain respect primarily for their expertise and intellectual contributions, NDT's audience may engage with him not only for his knowledge but because they enjoy his personality. His ability to present himself as a well-rounded individual, rather than just a "lone genius" scientist, may make him more accessible and relatable. This authenticity could help build trust and credibility with his audience, as it offers a more realistic, humanized version of a scientist, a figure who is both knowledgeable and approachable.

Another distinct way NDT represents science is through his use of the philosopher persona. In this aspect, he draws on his academic and scholarly expertise while also imbuing his content with moral and ethical considerations. Rather than simply presenting science as a neutral, fact-based discipline, NDT frequently discusses science in terms of its broader implications for humanity and society. By framing scientific issues through a philosophical lens, he encourages

his audience to reflect on the moral dimensions of scientific progress and how it should shape our world. This approach allows him to step beyond the boundaries of strict scientific analysis and engage with issues related to values, ethics, and human responsibility. In doing so, NDT attempts to reinforce his authority as a scientist but also invites his audience to consider the societal role of science, making his content more thought-provoking and engaging.

Through both his integration of humor and his philosophical reflections, NDT's portrayal of science becomes far more than just the presentation of data and facts. He could potentially influence the narrative around science, showing that it is not only about impersonal analysis but also about human connection and cultural relevance. This broader approach helps to engage a wider audience and challenges traditional perceptions of scientists and science communication.

For example, on August 13<sup>th</sup>, 2022, NDT posted:

Chapter: CONFLICT & RESOLUTION "Across the six-year span of World War II, more than 1,000 people were killed per hour. A morbid and inevitable consequence of forcing your personal truths upon others in a world that is fundamentally pluralistic."  
<https://t.co/SwHReTNRAN>

In this tweet, NDT extends his reasoning to make broader points about how the world should behave, something that traditional scientists generally avoid. Scientists typically strive to remain objective, drawing conclusions based on data and facts. Philosophy, however, as NDT uses it, incorporates similar reasoning but also includes moral considerations. While physical scientists attempt to avoid personal bias in their work to maintain impartiality, philosophy as NDT uses it, allows him to incorporate his emotions, morality, and personal judgment, elements that scientific practice traditionally seeks to exclude. This blending of philosophy with science gives NDT the freedom to speak on a wider range of topics while still grounding his arguments in his scientific expertise and academic tone. It also empowers him to advocate for the value of science and other scientific institutions in shaping societal norms and behaviors. This approach not only maintains

the cultural relevance of science but also may help NDT to stay relevant within the broader cultural discourse.

Another key component of NDT's depiction of science is that his reputation depends on him weighing in on ideas as a "scientist". A significant aspect of his brand is using his pedantic nature as a form of entertainment, particularly when he brings scientific critique to cultural content. By correcting small details and inserting scientific facts into discussions about popular culture, he may increase his authority as an expert. This pedantic persona, in which he emphasizes his scientific and scholarly logic, allows him to critique inaccuracies in a way that reinforces his scientific credibility. His focus on minute and esoteric details which adds to his portrayal as a scientist who is deeply invested in the accuracy of information. This behavior attempts to solidify his image as a scientist who is dedicated to precision and clarity, even when critiquing trivial matters.

However, this pedantic persona also runs the risk of perpetuating an image of scientists as elitist or arrogant. While NDT's corrections may lend authenticity and depth to his persona as a scientist, they can also make science seem inaccessible to the average person. The tone, often infused with sarcasm or a sense of superiority, might alienate audiences who already find academia intimidating or distant.

For example, NDT often comments on the science depicted in new movies, using his expertise to highlight inaccuracies or oversimplifications. This allows him to remain true to his established brand, by merging science with entertainment, while staying relevant and engaged with ongoing cultural conversations. His scientific critique in these contexts helps him maintain his public image as both a scientist and a potentially relatable figure; while staying relevant by

consistently commenting on current social media trends so he remains in the cultural eye. For example, on February 25<sup>th</sup> 2020, NDT is critiquing the logic of the scientists in the movie:

In "The Martian" (2015) the Rocket gets rattled by a raging wind storm forcing them to launch from Mars without Mark Watney. But at only 1% that of Earth, the Martian atmosphere is so thin, 100 mph winds would feel like a gentle breeze.  
<https://t.co/WQNcQ1J2bc>

While NDT draws heavily on scientific and scholarly expertise, his pedantic nature aligns with popular depictions of scientists in the media. In critiquing minute details, he adheres to the conventional image of the meticulous, detail-oriented scientist. However, NDT has also strategically incorporated this trait into his online persona as a way to try to remain relevant in popular culture. By critiquing films and media in a scientifically pedantic manner, he both conforms to the established norms of scientific discourse. In doing so, he balances the need to maintain credibility with the necessity of engaging with a wider audience. Should he diverge too far from these norms, his authority as a scientist could be questioned, so he sticks to these behaviors and even amplifies them for broader appeal.

NDT has also played a significant role in contributing to online science culture and what it means to be a scientist in the public eye. His embrace of traditional scientific personas, like the Carl Sagan Wannabe and the Pedantic personas, coexists with his other roles as an influencer and celebrity figure. This blending of personas helps him navigate the evolving norms of science communication in the digital age. Social media, with its emphasis on brevity, humor, and virality, has altered the way science is portrayed and consumed. Whereas traditional science content may have been more complex and nuanced, much of the content that NDT produces caters to the fast-paced, bite-sized format demanded by online platforms. Science on social media is often reduced to eye-catching images or striking visuals with witty or entertaining captions—similar to Carl Sagan's *Cosmos*, but without the deep, explanatory content. The

complexity of scientific explanation has been replaced with simplicity and excitement, making it more digestible, but also less substantive.

This shift may have an affect on the overall nature of science content online, with an increasing focus on entertainment and engagement rather than detailed exploration. Movie critiques, for example, have become a popular way for NDT to demonstrate the relevance of science, while also using his pedantic persona to attempt to reinforce his authority. These critiques serve dual purposes: they validate science's place in popular culture while also leveraging his scientific expertise to create engaging content that is more likely to go viral. This approach is driven by the algorithms of social media platforms, which reward content that generates interaction and engagement.

While NDT has attempted to make science content more accessible, entertaining, and relatable than traditional portrayals, he has also contributed to a broader shift in how science is presented and consumed in the online space. By adapting science to the demands of digital culture, he has contributed to potential shifts in cultural narratives about what science is, what it looks like, and who can engage with it. Through his strategic blending of humor, celebrity, and scholarly authority, NDT has a potential role in evolving the public's relationship with science, making it more approachable while also reinforcing the status of science in contemporary discourse.

#### **6.4 Celebrity and Influencer**

As an active online personality NDT often performs more as an influencer rather than a scientist. This analysis found that 31% of the tweets that NDT produces fall in the scientist category. However, 75% of the tweets that NDT produces fall within the influencer category.

In the data, the frequency of tweets that rely on relatability and authenticity increases notably during the Trump presidency and the pandemic periods. This could be attributed to the heightened challenges faced by science communication during these times, as science content itself was under attack. During such periods, lighthearted and more relatable content may have resonated more with audiences, offering a sense of trustworthiness and stability. However, what is particularly interesting is that while the amount of relatability-focused content increased and then decreased over time, science-related content did not follow the same trajectory. Over the course of the dataset, the proportion of science content NDT produced declined from 31% at the start of the period to 22% by the end, with a low point of 20% during the Trump presidency.

This reduction in science content can be attributed to several factors, including NDT's evolving role as an influencer. As his popularity grew, he increasingly relied on his social media presence as a platform to promote and sell his products, such as books and science-related content, rather than focusing primarily on traditional scientific discourse. The shift in social media norms toward shorter, more digestible content also contributed to this change. As platforms evolved, NDT, like many other content creators, adapted to the preference for quick, easily consumable material, which often means less complex, in-depth science content. To remain relevant and engage his audience, NDT altered his content to align with the trends that dominated the algorithmic feeds of social media platforms, leading to a reduction in more detailed science content.

Furthermore, as social media norms shifted to prioritize authenticity and relatability over celebrity personas, NDT increasingly leaned into his influencer and average bloke personas. These personas emphasize his human side, his humor, everyday interests, and approachability, aligning with the growing demand for content that feels more personal and grounded in

"realness." With social media offering more direct access to public figures, audiences have become more interested in the individuals behind the content. This shift in audience expectations has made authenticity a valuable commodity, helping NDT maintain engagement with his followers.

In this context, the reduction in science content is not only a response to changes in social media norms but also reflects broader shifts in the culture surrounding science communication. As the emphasis on personality, relatability, and authenticity grew, NDT's content had to adapt to these changing expectations in order for him to remain successful on these sites. The decreased focus on complex scientific explanations is indicative of a broader trend in online science culture, wherein science must be simplified to fit within the evolving landscape of digital media. In this way, the reduction of science-focused content represents a convergence of both platform-driven shifts and cultural changes within the realm of science communication.

### **6.5 NDT's Portrayal of Scientist**

NDT states in his CV that Twitter is his largest platform for science communication (deGrasse Tyson, 2023), which makes it particularly interesting that, over the course of the dataset, only 22-31% of his tweets focus directly on science-related content. While NDT describes himself as an astrophysicist in his media presence and on his Twitter bio, his personal branding heavily relies on the image of being a scientist and science communicator. He often portrays himself through visuals, such as wearing astronomy-themed clothing in his profile picture and using a science comic as his background image. Despite these signals of scientific expertise, the majority of his content does not directly engage with science in a traditional sense. This discrepancy reveals a broader trend in social media-based science communication, where

success does not hinge solely on the type of content produced but rather on the individual's charisma, entertainment value, and relatability.



Figure 4. NDT's Twitter Profile

NDT's success on Twitter is not based on producing large volumes of science content; instead, he attempts to build a connection with his audience by making them feel like part of the science community. Through the use of various personas, such as the philosopher and pedantic personas, he creates a language that resonates with his audience and positions them as intellectual peers. By referencing popular science-related media, as in the nerd persona, NDT makes science seem accessible and engaging, even to those without specialized scientific knowledge. He fosters a sense of inclusion in the scientific community without requiring direct participation or understanding of complex scientific principles. His content often mirrors what his audience *thinks* science looks like rather than what it actually entails. This approach

effectively blurs the lines between science and entertainment, creating a shallow, more digestible representation of science that appeals to a broad audience.

The fact that NDT does not rely heavily on actual science content to establish a sense of belonging within the science community speaks to the evolving cultural norms surrounding science communication. In many ways, science content on social media has moved away from presenting complex, technical information and toward creating an emotional or social connection with the audience. This shift has led to a form of science communication that prioritizes community-building and relatability over educational depth. NDT's ability to make his audience feel included, without necessarily offering them a deep dive into scientific concepts, reflects a larger trend in which popular representations of science are less about teaching and more about creating the *appearance* of being part of the scientific conversation. This approach could have an impact on how science is portrayed and consumed in the digital age, as the boundaries between science, entertainment, and social media become increasingly blurred.

Overall, NDT relies on his celebrity expertise in 26% of his tweets, compared to 22% focused on scientific content, with the proportion of celebrity-related content increasing over time, particularly during the promotion of his latest book. This trend may reflect the increasing importance of maintaining public relevance, especially in the media-driven, influencer culture of the digital age. As a celebrity scientist, NDT must not only stay connected to his scientific community but also cultivate a public persona that keeps him visible in an ever-evolving media landscape. In this way, NDT's approach contrasts with that of more traditional scientists, whose work tends to prioritize the production and distribution of knowledge. While NDT still engages with scientific topics, much of his content centers on self-promotion and leveraging his public profile, rather than advancing scientific knowledge. His approach underscores the importance of

maintaining a strong, relatable public presence to remain relevant, especially in an era where social media and personal branding have become integral to professional success.

Although NDT brands himself as a "celebrity scientist," the content of his tweets does not strictly reflect this identity in the traditional sense. Rather than focusing predominantly on scientific expertise, his tweets draw heavily on influencer-related and celebrity expertise. This blend of personas may help him to appeal to a broader audience by combining the trust associated with both celebrity status and scientific credibility. By positioning himself as both charming and intelligent, NDT successfully balances the traits of a celebrity with those of a knowledgeable scientist, offering a compelling combination that could increase his public credibility. This hybrid persona could be effective in establishing trust with online communities, many of whom may not be as familiar with the specific markers of scientific expertise but are more likely to relate to his celebrity presence and apparent intellectual authority.

While his celebrity persona plays a significant role in establishing trust, his scientific expertise is the least emphasized aspect of his Twitter content. This observation suggests that scientific knowledge, in its technical form, may not be the most effective means of gaining public trust, especially for audiences who may lack the expertise to fully engage with complex scientific discussions. Instead, NDT leverages more accessible persona aspects, such as his pedantic and philosopher personas, to demonstrate his intellectual authority in ways that resonate with the public.

In essence, NDT's strategy highlights the evolving nature of science communication in the public sphere. While traditional scientific expertise is crucial within academic and professional circles, the ability to connect with and relate to the public often requires a different approach. NDT understands that to effectively engage with a wider audience, one must rely on

personas and behaviors that align with public perceptions of what a scientist *should* be like, rather than strictly adhering to the norms of scientific discourse. This combination of celebrity charm, relatability, and intellectual authority allows NDT to navigate the complex landscape of online science communication, increasing his potential influence and expanding the reach of his science-related content.

## 6.6 NDT's Brand

One of the key components of NDT's brand is his role as an accessible and relatable science communicator, making complex scientific concepts understandable to the general public. His unique position in the media sphere stems from his ability to reach and engage audiences without requiring a deep scientific background. This accessibility is crucial to his success, as it not only differentiates him from other scientists but also may help him be seen as a trusted source of science information. By translating complex scientific ideas into language that resonates with the public, ND attempts to build credibility and foster trust. His identity as an astrophysicist lends him the expertise needed to maintain authority in this space, yet it is his ability to connect with diverse audiences that truly defines his online brand as a science communicator. For example, on November 30<sup>th</sup> 2020, NDT tweeted:

If you are never in a hurry, then continue to ignore "Astrophysics for People in a Hurry." It's for anyone who seeks basic fluency in my field- but doesn't have time to read fat books.  
<https://t.co/RNgcPH85GP>  
FYI: Audio Book narrated in my voice. <https://t.co/RNQ7DoVqAL>

However, because NDT often speaks on topics beyond astrophysics, he draws on a range of scholarly personas to build his credibility and reinforce his brand image. While his science knowledge serves as a foundation for his brand, he also presents himself as an approachable figure, someone the public can engage with, ask questions of, and interact with directly. Known

for consistently commenting on how science intersects with pop culture, he uses his scientific expertise to add depth to these observations. This reflects a significant reliance on his influencer persona, wherein he actively engages with his audience and establishes a sense of connection. Another crucial aspect of being an influencer is maintaining relevance within culture, which NDT achieves by commenting on current events and regularly producing content that keeps him visible on platforms.

One of the consequences of this branding strategy is the consequences of branding itself: to make a profit. NDT's podcast, *StarTalk*, and his books on various science-related and non-science topics not only serve to engage his audience but also generate income. Like any other celebrity or influencer, he leverages his platform to sell content, positioning himself as the go-to figure for making science accessible to the public. By cultivating a persona that blends scientific authority with approachability, NDT may be seen as a trusted source, translating complex scientific ideas into formats that are digestible for non-experts.

However, this approach also distances him from traditional scientific communities. Rather than focusing solely on advancing scientific knowledge, NDT maximizes the commercial potential of science content. His books, for example, are marketed as easy-to-understand guides, with him as an authoritative figure capable of translating the complexities of science. This kind of branding not only capitalizes on his celebrity status but also molds science into a product that is easy to consume, aligning with the broader trends in influencer marketing where content is designed to be accessible, entertaining, and easily purchasable.

This commercial aspect of his brand aligns with the evolving norms of social media, where conciseness, engagement, and relatability are key. Science content, therefore, is often simplified and packaged for mass consumption. The scientific community might prioritize depth

and accuracy, but NDT's brand is centered around offering a "science aesthetic" that is easy to digest and visually appealing qualities that resonate with the expectations of his online audience. Over time, his brand has adapted to these shifts, transforming science into something that is not only accessible but also a marketable product. Through this approach, NDT offers the public an entry point into science, not necessarily in its most rigorous or academic form, but in a way that encourages participation, enjoyment, and ultimately, consumption.

## **6.7 Science Aesthetic**

To succeed on social media, content must be engaging and entertaining, as it generates more interaction and visibility. This principle also applies to science content, which, as a result, becomes shorter, less complex, and more focused on entertainment. Science posts from NDT often take the form of fun facts, short videos, and eye-catching images, all filtered through his various persona aspects, particularly the Carl Sagan Wannabe persona. The emphasis on making content engaging often limits the depth and complexity of the information that can be communicated. For example, the constraints of platforms like Twitter, which prioritize short-form content, restrict the amount of scientific information that can be shared. This results in content that is reduced to quippy science facts, inspirational quotes, and visually appealing images, such as those NDT is known for. In this way, NDT's tweets reflect a "science aesthetic" a strategy that allows him to present himself as a science expert to his audience while simultaneously promoting content that offers a superficial representation of science. This enables him to commodify science as a central element of his brand, thereby generating profit through his social media presence.

The Carl Sagan Wannabe and Science Communicator personas lend credibility to these posts, as they suggest expertise and authority in science communication. However, the need to

compete for attention within the fast-paced, algorithm-driven environment of social media pushes NDT to prioritize conciseness and entertainment over depth. The content he produces is constrained by the platform's affordances and the necessity of broad audience appeal. This simplification of science to static facts and short, non-complex ideas could potentially shape the public's understanding of science in ways that may conflict with its true nature. When the public encounters more nuanced, complex, and peer-reviewed science outside of these accessible formats, it may challenge their existing conceptions of what science "looks like." This shallow representation of science, while effective for engagement, overlooks the nuanced, ever evolving, and intricate nature of scientific knowledge.

While NDT's relatable and humorous content may help spark interest in science among a wider audience, it also contributes to the commodification of science. His portrayal of science as a form of entertainment, packaged in digestible, fun formats, turns it into a profitable product for creators. As a science communicator, NDT has contributed to an increase in public awareness of science and making science seem more relatable, yet this has come at the cost of simplifying and distorting its core values. His branding and content production, designed for social media success, conflict with the ideals of scientific inquiry, which prioritize depth, complexity, and the sharing of knowledge for the sake of knowledge.

What makes NDT successful as an online personality is his ability to perform within the norms of the influencer landscape. He excels by maintaining relevance through the use of personas like the nerd, the average bloke, and the Carl Sagan Wannabe, in which he tries to emotionally connect with his audience. These personas, along with what attempts to be engaging and relatable content, may build an emotional connection that goes beyond traditional scientific

expertise. While NDT does draw on his scientific background, it is his ability to perform the role of an influencer, not the content of his science, that drives his success.

The science NDT communicates online is designed to attract interest and direct people to his other content wherein he earns a profit, such as his books, podcasts, and speaking engagements. This is a highly effective marketing strategy for an influencer looking to generate revenue but is at odds with the traditional scientific ethos, which values the free sharing of knowledge for educational purposes. In this way, NDT's use of science content is less about advancing public understanding of science and more about leveraging his celebrity to promote and sell science as a product.

Ultimately, NDT's tweets reflect a preference for creating marketable content rather than promoting science for the sake of education. The commodification of science under his brand highlights a broader trend in the social media environment, where scientific knowledge is transformed into a consumable product designed to attract attention, drive engagement, and generate profit. NDT is not unique in participating in these trends; rather, his approach reflects a broader shift in the ways science communication and science influencing have evolved within online social media environments.

## CHAPTER 7. CONCLUSION

### 7.1 Trust in Science

As the amount of science information has increased in online spaces, there has been a corresponding decline in trust in science and a decrease in the perceived positive impact of science content over time (Kennedy & Tyson, 2023). According to Pew Research, while 73% of U.S. adults express confidence in scientists to act in the public's best interest, overall trust in science has dropped by 14 percentage points since the pandemic. This erosion of trust is not limited to science; although scientists and medical professionals still enjoy relatively high regard, trust in government officials and institutions has declined, and media trust has also diminished, with 53% of the public expressing unfavorable views of the media (Kennedy & Tyson, 2023). This rise in distrust is largely driven by a perception that institutions, whether governmental, media, or scientific, are no longer acting in the best interests of the public (Sforza, 2023).

Amid this climate of increasing skepticism, younger people are turning to social media as their primary source of news and information. Specifically, young adults now trust information from social media almost as much as they do from traditional national news outlets (Liedke & Gottfried, 2022). With younger demographics increasingly relying on social media for science-related content, it is crucial that the information shared on these platforms is accurate and not overly simplified. The “science aesthetic” on these platforms often reduces complex scientific concepts into shallow representations that prioritize entertainment over substance. In this aesthetic, the intricate workings of science are stripped away, and science content is transformed into entertainment, which may contribute to public misunderstandings about how science functions. This distortion of information in an environment already marked by waning trust in

traditional media and scientific institutions makes it crucial to understand the implications of the science aesthetic online.

NDT exemplifies the power and success of a science influencer who thrives in this social media environment by shaping his content to meet the expectations of the platform and its audience. Beyond his social media presence, NDT's brand extends to other profitable ventures, such as books and lectures, which align with the persona he has crafted online. His content is not just about popularizing science; it is about branding himself as a go-to source for science-related information. In doing so, he has created a self-sustaining cycle where his brand drives his science content, which in turn propels further opportunities for profit.

The way NDT portrays science online is notably different from the way academic scientists typically communicate their work. His primary focus is on the accessibility of science content, with the aim of making science interesting and engaging for a broad audience. However, while this approach may successfully spark curiosity, the science aesthetic he promotes could have broader implications for public understanding of science. By focusing heavily on entertainment, NDT's science aesthetic relies on influencer tactics that prioritize audience engagement over scientific depth. This form of science communication, driven by fame and marketing, differs significantly from academic science, which values the accurate transmission of complex ideas. The result is a depiction of science that is not just simplified but also commodified, with the goal of generating profit rather than advancing public understanding for its own sake.

In science communication research, one key aspect of creating research-informed content is addressing the uncertainty inherent in scientific processes. Studies have shown that discussing uncertainty can enhance trust in scientists and may serve as a strategy to mitigate ambiguity

aversion in communication efforts (Han et al., 2021; Retzbach & Maier, 2014). However, it is noteworthy that NDT does not address uncertainty in his own work and tends to avoid discussing this issue. His avoidance of uncertainty, along with other controversial science topics, may provide insight into how the media environment influences online personalities in choosing content that aligns with social media norms. In this context, NDT's portrayal of science may differ from research-based approaches aimed at effective science communication with the public. His brand, therefore, might play a significant role in his performance within the online ecosystem and could help him reach broader audiences. Future research examining how NDT presents science in the online ecosystem, as well as audience reception, could offer further insight into the effects of his branding and methods of influencing science communication online.

As a famous public figure, NDT's portrayal of science, and by extension, his portrayal of scientists, has the potential to shape how the public views who qualifies as an expert in science. Science in this work is defined as participating in the scientific process, such as participating in the scientific method, experimenting, etc., and participating in the scientific culture, such as adhering to norms within the science community. The line between expertise and entertainment has already been blurred, but inconsistent representations of what a "normative" scientist are could further complicate public perceptions of scientific credibility. NDT's online persona as a science communicator is at odds with the traditional image of a scientist, creating a tension between the science community and the influencer-driven world of science communication. This tension raises important questions about the future of science communication in an increasingly commercialized and entertainment-driven media landscape. Further research into the impact of these differences, both in terms of content and persona, on public perceptions of science could

provide valuable insights into how science is consumed, understood, and trusted in the digital age.

## **7.2 Concluding Summary**

In this project the goal was to understand how science influencers chose what content to create and share online, by utilizing an analysis of the aspects NDT draws on to be a successful influencer. The way that people conceptualize science in society, or the social constructions are a factor in shaping what a scientist and in turn a science influencer does or does not do (Kuhn,1970; Pinch & Bijker, 1984). These social constructions greatly shape the acceptable concepts of science as well as establish and reinforce the norms. These norms and the inherent culture that surrounds them reinforce the social constructions and give a perceived acceptability to what science looks like, what a scientist should do, and how scientists and science influencers should behave online (Cheryan et al., 2013). The social constructions of science and the norms show up in the chosen aspects of identify a science influencer may choose to use to communicate to their audience. In order for someone to trust a science personality there are also various factors that play into trusting them such as source credibility, relatability, perceived expertise, fame, and authenticity (Hovland & Weiss, 1952; AlFarraj et al., 2021; Singer et al., 2023; Ruiz-Gomez, 2019). If someone matches the norms and social constructions, they can earn this expertise easier and bolsters their trustworthiness. This expertise plays an important role in the brand that science influencers will establish and use to help solidify their identity online. Using the aspects of branding to analyze the science personality Neil DeGrasse Tyson shows what aspects of his identity he draws on, such as his expertise, his fame, or his relatability to create successful and influential content.

Online social media platforms provide an accessible entry point for people to engage with science, science communicators, and influencers in the space. However, the portrayals of science content in this space often conflict with traditional representations of science in other media spheres. NDT, for example, incorporates enthusiasm and emotional engagement in his content, using humor and personal connections to make science more accessible to his audience. He draws on various types of expertise such as scientific and scholarly, relatable and authentic, and notoriety and fame, to enhance his credibility with followers. By using personas such as the science communicator, pedantic, average bloke, nerd, influencer, Carl Sagan wannabe, and philosopher, NDT expresses different facets of his identity, allowing his audience to relate to him and reinforcing the expertise he has.

However, NDT's content on Twitter primarily leans toward influencer and celebrity personas rather than traditional science communication. On average, only 30% of his tweets draw on his scientific and scholarly expertise, while approximately 80% rely on his influencer-related expertise. Over the course of the dataset, the proportion of content focused on scientific expertise decreased, while the focus on notoriety and relatability increased. This shift reflects a change in NDT's brand, which increasingly emphasized accessible, digestible, and engaging science content, prioritizing the commodification of his personal brand over science education. As a result, NDT's science-related posts on social media often served as a means to promote his books, podcasts, and other profit-generating content, rather than facilitating knowledge acquisition for the sake of education.

This shift, observed in NDT's tweets from 2016 to 2023, illustrates broader trends in science communication on social media. It also highlights how influencers, like NDT, adapt their content production to align with the evolving norms and expectations of digital platforms, where

engagement, entertainment, and personal branding increasingly shape the nature of science communication.

### **7.3 Utility of Persona Analysis**

In this analysis, I utilized a persona-based approach to examine how NDT strategically employs different facets of his identity to reinforce his expertise and establish connections with his audience. To begin, I categorized the various types of expertise that NDT draws upon to maintain his influence online, including his scientific and scholarly authority, relatability and authentic authority, and his notoriety and fame. This categorization allowed for a deeper understanding of the different roles NDT utilizes in his content creation on social media. As I conducted this analysis, recurring themes emerged as personas that he draws on, such as the science communicator, philosopher, nerd, influencer, and etc. These personas help him shape how his audience perceives his expertise and how he positions himself as a trusted authority.

The persona-based analysis proved especially useful for shedding light on how NDT's identity is not fixed but shifting according to the demands of the context for a given situation. In particular, it helped showcase that NDT's online presence is carefully curated, drawing on different aspects of his multifaceted identity to appeal to diverse audience members. The personas NDT adopts are not just arbitrary, they are tailored to resonate with the context of social media platforms, where engagement often relies on relatability, entertainment, and a casual nature. This fluidity highlights the interplay between environment and identity, showing that on social media, people may adapt and show specific aspects of themselves based on what is deemed most relevant and or appealing in a given context.

Moreover, this approach underscores the importance of understanding how different environments, such as social media platforms, shape the ways individuals present themselves.

The expectations and norms of these platforms, where content is often shorter, more digestible, and entertainment-driven, can influence the aspects of a person's identity they choose to highlight. In NDT's case, his transition from focusing primarily on traditional scientific content to leveraging his celebrity status and relatability demonstrates how platform-specific norms can encourage a shift in the personas an individual utilizes. This shift reflects broader trends in the on social media, where the audience's preference for engaging, authentic content influences how experts and influencers present their knowledge.

Thus, this method of persona analysis provides valuable insights into how individuals adapt their identities and expertise based on the specific demands of a given environment, such as social media, and helps explain how these environments shape the way content creators interact with their audiences. Ultimately, understanding the strategic use of personas allows for a richer understanding of how identity and expertise are constructed and communicated on social media sites. This method of analysis is a valuable tool for understanding other influencers and online personalities within the social media environment. Specifically, by analyzing various aspects of a persona and the ratios of each aspect used could be a useful way to understand the ways in which different online personalities strategically become successful online. The persona analysis method will be particularly useful in future research analyzing identity and the ways in which people showcase that in online environments.

#### **7.4 Limitations**

The limitations to this study include the study of the platform and tweets produced by NDT. The first aspect is that this study focuses on the Twitter of the past rather than the current Twitter. There may have been significant difference and implications from the changes of Twitter that would have changed the amount, type, and content of the tweets that NDT produces.

Another important limitation is the fact that the tweets collected do not contain any information on the images that are included in the tweets NDT produces. This is helped by doing a meta-analysis of the images on his page, as seen on his profile, but analysis is therefore limited in this sense. Another important limitation is the fact that these tweets may not have fully been crafted by NDT. As a celebrity, NDT has PR agents and other communications professional that may contribute to the crafting of this tweets, and there is no way as a researcher to know if the tweets are produced by him or someone else. This could limit the applicability of this analysis to other smaller science communicators or influencers. Finally, the conclusions drawn from this study only apply to the time periods of data collection. Examining a longer period of time might reveal patterns and themes not evident in these data.

The method of analysis also contains limitations. One important limitation is the fact that this type of analysis cannot account for the entire culture surrounding a specific text (Fairclough, 2003). This research can only offer insight into the text itself, and the information contained within, and what could be excluded. In order to fully understand a culture, or an institution's practices, other methods must be conducted in conjunction with this analysis (Fairclough, 2003). This method also relies on interpretation and coding done by the individual researcher. This would also include the inherent biases of the researcher and could limit the credibility of this research. In order to combat this, a second researcher will categorize a subset of tweets and discuss their rationales and process with the author. The author and the second researcher will discuss any discrepancies and adjust the parameters of categorization and analysis as needed.

## **7.5 Future Research**

This framework of analysis could potentially be used to understand other public intellectuals in online spaces or how different types of experts chose to share content. Future

research could offer insights in how this could be different across disciplines, levels of expertise, or even between different members of the same community. This same strategy could also be applied to online personalities in general. This research could also offer insight into further research that could investigate the ways that the audience interaction influences the culture, norms, and social constructions of science that may impact the content science influencers chose to create online. Understanding how the feedback from the audience, and from society, in the form of culture and norms, offers an in-depth framework for analysis to add to the body of work on science influencers.

Future research could be conducted to understand other public intellectuals to see if they perform in a similar framework online. Another potential direction for future research could be looking at the connection between the audience interaction and the content produced. There may be interesting insight that comes from analyzing the ways in which the audience actually (or maybe does not) shape the content that these producers choose to make (and to what effect) and how that then changes the parts of identity they draw on. Future research could also use this framework to create a comparison between well-liked and disliked public intellectuals to see where the differences are. Or research could conduct a comparison between public intellectuals with different kinds of expertise to see if there are any distinctions between the aspects they draw on. This research has the potential to produce results that contribute to science influencer literature and leads to new directions for this body of work.

## REFERENCES

- Abdulmajeed, M., & El-Ibiary, R. (2020). Analyzing the communicative strategies of Egyptian political influencers: Content and discourse analyses of Twitter accounts. *Communication & Society*, 33(2), 295–311. <https://doi.org/10.15581/003.33.2.295-311>
- AlFarraj, O., Alalwan, A. A., Obeidat, Z. M., Baabdullah, A., Aldmour, R., & Al-Haddad, S. (2021). Examining the impact of influencers' credibility dimensions: Attractiveness, trustworthiness and expertise on the purchase intention in the aesthetic dermatology industry. *Review of International Business and Strategy*, 31(3), 355–374. <https://doi.org/10.1108/RIBS-07-2020-0089>
- AP-NORC. *Major declines in the public's confidence in science in the wake of the pandemic*. (2023, June 15). <https://apnorc.org/projects/major-declines-in-the-publics-confidence-in-science-in-the-wake-of-the-pandemic/>
- Atiq, M., Abid, G., Anwar, A., & Ijaz, M. F. (2022). Influencer Marketing on Instagram: A Sequential Mediation Model of Storytelling Content and Audience Engagement via Relatability and Trust. *Information*, 13(7), 345. <https://doi.org/10.3390/info13070345>
- Bae, Y., Ryu, P.-M. and Kim, H. (2014), Predicting the Lifespan and Retweet Times of Tweets Based on Multiple Feature Analysis. *ETRI Journal*, 36: 418-428. <https://doi.org/10.4218/etrij.14.0113.0657>
- Bakke, M.A. (2017). Celebrity is what Celebrity does. A Critical Discourse Analysis of Microcelebrity in Commercial, Norwegian Blogs.
- Batzke, M., & Ernst, A. (2023). Conditions and Effects of Norm Internalization. *Journal of Artificial Societies and Social Simulation*, 26(1), 6. <https://doi.org/10.18564/jasss.5003>

- Berdahl, L., Bourassa, M., Bell, S., & Fried, J. (2016). Exploring Perceptions of Credible Science Among Policy Stakeholder Groups: Results of Focus Group Discussions About Nuclear Energy. *Science Communication*, 38(3), 382–406.  
<https://doi.org/10.1177/1075547016647175>
- Berger, P. L., & Luckmann, T. (1966). *The Social Construction of Reality*.
- Berkowitz, A. D. (2004). The Social Norms Approach: Theory, Research, and Annotated Bibliography.
- Bosch, M. (2013). Persona and the Performance of Identity Parallel Developments in the Biographical Historiography of Science and Gender, and the Related Uses of Self Narrative. *L'Homme*, 24(2). <https://doi.org/10.7767/lhomme.2013.24.2.11>
- Boynton, M. J. (n.d.). *PERFORMING NERD: THE NERD STEREOTYPE IN AMERICAN POPULAR CULTURE*.
- Bradshaw, A. S., Shelton, S. S., Wollney, E., Treise, D., & Auguste, K. (2021). Pro-Vaxxers Get Out: Anti-Vaccination Advocates Influence Undecided First-Time, Pregnant, and New Mothers on Facebook. *Health Communication*, 36(6), 693–702.  
<https://doi.org/10.1080/10410236.2020.1712037>
- Brems, C. Temmerman, M. Graham T. & Broersma, M. (2017) Personal Branding on Twitter, *Digital Journalism*, 5:4, 443-459, DOI: 10.1080/21670811.2016.1176534
- Brooks, G., Drenten, J., & Piskorski, M. J. (2021). Influencer Celebri-fication: How Social Media Influencers Acquire Celebrity Capital. *Journal of Advertising*, 50(5), 528–547.  
<https://doi.org/10.1080/00913367.2021.1977737>
- Brossard, D., & Scheufele, D. A. (2013). Science, New Media, and the Public. *Science*, 339(6115), 40–41. <https://doi.org/10.1126/science.1232329>

- Carter, M. J., & Fuller, C. (2015). Symbolic interactionism. Sociopedia.  
<https://doi.org/10.1177/205684601561>
- Cheryan, S., Plaut, V. C., Handron, C., & Hudson, L. (2013). The Stereotypical Computer Scientist: Gendered Media Representations as a Barrier to Inclusion for Women. *Sex Roles*, 69(1–2), 58–71.  
<https://doi.org/10.1007/s11199-013-0296-x>
- CDC. (2023, March 15). CDC Museum COVID-19 Timeline. Centers for Disease Control and Prevention; CDC. <https://www.cdc.gov/museum/timeline/covid19.html>
- Chapekis, A., & Smith, A. (2023, May 17). *How U.S. adults on Twitter use the site in the Elon Musk era*. Pew Research Center. <https://www.pewresearch.org/short-reads/2023/05/17/how-us-adults-on-twitter-use-the-site-in-the-elon-musk-era/>
- Chayka, K. (2024). *Filterworld: how algorithms flattened culture*. First edition. New York, Doubleday.
- Chen, E., Lerman, K., & Ferrara, E. (2020). Tracking Social Media Discourse About the COVID-19 Pandemic: Development of a Public Coronavirus Twitter Data Set. *JMIR public health and surveillance*, 6(2), e19273. <https://doi.org/10.2196/19273>
- Chimba, M., & Kitzinger, J. (2010). Bimbo or boffin? Women in science: an analysis of media representations and how female scientists negotiate cultural contradictions. *Public Understanding of Science*, 19(5), 609–624. <https://doi.org/10.1177/0963662510377233>
- Chinn, S., Hiaeshutter-Rice, D., & Chen, K. (2023). How Science Influencers Polarize Supportive and Skeptical Communities Around Politicized Science: A Cross-Platform and Over-Time Comparison. *Political Communication*, 1–22.  
<https://doi.org/10.1080/10584609.2023.2201174>

- Choi, J. A. (2018). *Celebrities of the Digital Era: Conceptualization of Social Media Celebrities as Brand Endorsers*. [ Doctoral dissertation, University of Texas at Austin]. ProQuest Dissertations Publishing.
- Crenshaw, K. (1989). *Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics*.
- Christidou, V., Dimopoulos, K., & Koulaidis, V. (2004). Constructing social representations of science and technology: The role of metaphors in the press and the popular scientific magazines. *Public Understanding of Science*, 13(4), 347–362.  
<https://doi.org/10.1177/0963662504044108>
- Curriculum Vitae: Neil deGrasse Tyson*. (2023). [neildegrassetyson.com](https://neildegrassetyson.com).  
<https://neildegrassetyson.com/cv/>
- Daston, L., & Sibum, H. O. (2003). Introduction: Scientific Personae and Their Histories. *Science in Context*, 16(1–2), 1–8. <https://doi.org/10.1017/S026988970300067X>
- Davies, S. R., & Horst, M. (2016). *Science Communication*. Palgrave Macmillan UK.  
<https://doi.org/10.1057/978-1-137-50366-4>
- Denia, E. (2020). The impact of science communication on Twitter: The case of Neil deGrasse Tyson. *Comunicar*, 28(65), 21–30. <https://doi.org/10.3916/C65-2020-02>
- Dillard, C. R. (2021). *Beauty, Brains, and Boldness: A Critical Discourse Analysis of Influencer-Edutainer Jackie Aina's "Unpopular Opinions"* (Order No. 28416763). Available from ProQuest Dissertations & Theses Global. (2542374678).  
<https://ezproxy2.library.colostate.edu/login?url=https://www.proquest.com/dissertations-theses/beauty-brains-boldness-critical-discourse/docview/2542374678/se-2>

- Dinesh, S., & Odabaş, M. (2023). *8 Facts about Americans and Twitter as It Rebrands to X*. Pew Research Center. <https://www.pewresearch.org/short-reads/2023/07/26/8-facts-about-americans-and-twitter-as-it-rebrands-to-x/>
- Djafarova, E., & Trofimenko, O. (2019). ‘Instafamous’ – credibility and self-presentation of micro-celebrities on social media. *Information, Communication & Society*, 22(10), 1432–1446. <https://doi.org/10.1080/1369118X.2018.1438491>
- Dudo A, Besley JC (2016) Scientists’ Prioritization of Communication Objectives for Public Engagement. *PLoS ONE* 11(2): e0148867. <https://doi.org/10.1371/journal.pone.0148867>
- Du Gay, P. (2013). *Doing cultural studies: The story of the Sony Walkman* (Second edition). Sage Publications.
- Fahy, D. (2013). Science and celebrity studies: Towards a framework for analysing scientists in public. In: M. Bucchi, B. Trench (eds.), *Quality, Honesty and Beauty in Science Communication, Conference, Venice: Edizioni Science in Society*, pp. 295-298
- Fahy, D. (2022). Caricatures and omissions: Representations of the news media in ‘Don’t look up.’ *Journal of Science Communication*, 21(05), C07. <https://doi.org/10.22323/2.21050307>
- Fairclough, N. (2003). *Critical Discourse Analysis*. Routledge.
- Florini, S. (2014). Tweets, Tweeps, and Signifyin’: Communication and Cultural Performance on “Black Twitter.” *Television & New Media*, 15(3), 223–237. <https://doi.org/10.1177/1527476413480247>
- Funk, C. (2017.). *Mixed Messages about Public Trust in Science*.

- Gallup, I. (2018, October 12). *U.S. Media Trust Continues to Recover From 2016 Low*. Gallup.com. <https://news.gallup.com/poll/243665/media-trust-continues-recover-2016-low.aspx>
- Gao, Q., & Feng, C. (2016). Branding with social media: User gratifications, usage patterns, and brand message content strategies. *Computers in Human Behavior*, 63, 868–890. <https://doi.org/10.1016/j.chb.2016.06.022>
- Goffman, E. (1959). *The presentation of self in everyday life*. Bantam Doubleday Dell Publishing Group.
- Guidry, J. P. D., Jin, Y., Orr, C. A., Messner, M., & Meganck, S. (2017). Ebola on Instagram and Twitter: How health organizations address the health crisis in their social media engagement. *Public Relations Review*, 43(3), 477–486. <https://doi.org/10.1016/j.pubrev.2017.04.009>
- Haelle, T. (2015, November 5). *Neil deGrasse Tyson On Football, Women In STEM And Mainstreaming Science*. Forbes. Retrieved October 22, 2023, from <https://www.forbes.com/sites/tarahaelle/2015/11/05/neil-degrasse-tyson-on-football-women-in-stem-and-mainstreaming-science/?sh=74e6664a62f3>
- Han, J., & Balabanis, G. (2023). Meta-analysis of social media influencer impact: Key antecedents and theoretical foundations. *Psychology & Marketing*. <https://doi.org/10.1002/mar.21927>
- Han, P., Scharnetzki, E., Scherer, AM., Thorpe, A., Lary, C., Waterston, LB., Fagerlin, A., Dieckmann, NF., (2021). Communicating Scientific Uncertainty About the COVID-19 Pandemic: Online Experimental Study of an Uncertainty-Normalizing Strategy *J Med Internet Res*. <https://doi.org/10.2196/27832>

- Hayes, J. L., Britt, B. C., Applequist, J., Ramirez, A., & Hill, J. (2020). Leveraging Textual Paralanguage and Consumer–Brand Relationships for More Relatable Online Brand Communication: A Social Presence Approach. *Journal of Interactive Advertising*, 20(1), 17–30. <https://doi.org/10.1080/15252019.2019.1691093>
- Hermawan, D. (2021). Influencer Marketing in Digital Era: Does It Really Works? *International Journal of Management, Entrepreneurship, Social Science and Humanities*, 3(2). <https://doi.org/10.31098/ijmesh.v3i2.260>
- Hoffman, S. J., & Tan, C. (2015). Biological, psychological and social processes that explain celebrities' influence on patients' health-related behaviors. *Archives of public health = Archives belges de sante publique*, 73(1), 3. <https://doi.org/10.1186/2049-3258-73-3>
- Hogle, L. F. (2002). Introduction: Jurisdictions of authority and expertise in science and medicine. *Medical Anthropology*, 21(3–4), 231–246. <https://doi.org/10.1080/01459740214076>
- Hollenbaugh, E. (2021). Self-Presentation in Social Media: Review and Research Opportunities. *Review of Communication Research*, 9, 80–98. <https://doi.org/10.12840/ISSN.2255-4165.027>
- Höttecke, D., & Allchin, D. (2020). Reconceptualizing nature-of-science education in the age of social media. *Science Education*, 104(4), 641–666. <https://doi.org/10.1002/sce.21575>
- Hovland, C. I., & Weiss, W. (1951). The Influence of Source Credibility on Communication Effectiveness. *The Public Opinion Quarterly*, 15(4), 635–650. <http://www.jstor.org/stable/2745952>

- Hunter, I. (2007). THE HISTORY OF PHILOSOPHY AND THE PERSONA OF THE PHILOSOPHER. *Modern Intellectual History*, 4(3), 571–600.  
<https://doi.org/10.1017/S1479244307001424>
- Indrawati, D., Luckieta, M., & Nadelia, F. (2023). Critical multimodal discourse analysis of YouTube influencers' impact on purchase intention. 150015.  
<https://doi.org/10.1063/5.0110894>
- Jacobson, S. (2013). Does Audience Participation on Facebook Influence the News Agenda? A Case Study of The Rachel Maddow Show. *Journal of Broadcasting & Electronic Media*, 57(3), 338–355. <https://doi.org/10.1080/08838151.2013.816706>
- Jang, S. M. (2014). Seeking Congruency or Incongruency Online?: Examining Selective Exposure to Four Controversial Science Issues. *Science Communication*, 36(2), 143–167.  
<https://doi.org/10.1177/1075547013502733>
- Jin, S. V., Muqaddam, A., & Ryu, E. (2019). Instafamous and social media influencer marketing. *Marketing Intelligence & Planning*, 37(5), 567–579. <https://doi.org/10.1108/MIP-09-2018-0375>
- Jokanovic, I. (2023). *Research Report: A critical discourse analysis of the operation of power and ideology in COVID-19 vaccine Twitter commentary.*
- Jokinen, T. (2016). Branding in Social Media and the Impact of Social Media on Brand Image.
- Kanai, A. (2019). Gender and Relatability in Digital Culture: Managing Affect, Intimacy and Value. Springer International Publishing. <https://doi.org/10.1007/978-3-319-91515-9>
- Kaplan, D. (2023). Performing Identity or Performing Relationships? Rethinking Performance Theory in Social Media Studies. *Cultural Sociology*, 17499755221149184.  
<https://doi.org/10.1177/17499755221149184>

- Kendall, L. (1999). Nerd nation: Images of nerds in US popular culture. *International Journal of Cultural Studies*, 2(2), 260–283. <https://doi.org/10.1177/136787799900200206>
- Kennedy, B., Tyson, A., & Funk, C. (2022, February 15). *Americans' Trust in Scientists, Other Groups Declines*. Pew Research Center Science & Society.  
<https://www.pewresearch.org/science/2022/02/15/americans-trust-in-scientists-other-groups-declines/>
- Ki, C.-W., Cuevas, L. M., Chong, S. M., & Lim, H. (2020). Influencer marketing: Social media influencers as human brands attaching to followers and yielding positive marketing results by fulfilling needs. *Journal of Retailing and Consumer Services*, 55, 102133.  
<https://doi.org/10.1016/j.jretconser.2020.102133>
- Khairy, L. (2019). Applying the Four Models of Science Journalism to the Publics' Interaction with Coronavirus News. 28.
- Kim, J., & Kim, M. (2022). Rise of social media influencers as a new marketing channel: Focusing on the roles of psychological well-being and perceived social responsibility among consumers. *International Journal of Environmental Research and Public Health*, 19(4). NCBI. <https://doi.org/10.3390/ijerph19042362>
- Korstjens, I., & Moser, A. (2018). Series: Practical guidance to qualitative research. Part 4: 54 Trustworthiness and publishing. *European Journal of General Practice*, 24(1), 120–124.  
<https://doi.org/10.1080/13814788.2017.1375092>
- Kozlowski, D., Larivière, V., Sugimoto, C. R., & Monroe-White, T. (2022). Intersectional inequalities in science. *Proceedings of the National Academy of Sciences*, 119(2), e2113067119. <https://doi.org/10.1073/pnas.2113067119>

- Krause, N. M., Freiling, I., & Scheufele, D. A. (2022). The “Infodemic” Infodemic: Toward a More Nuanced Understanding of Truth-Claims and the Need for (Not) Combatting Misinformation. *The ANNALS of the American Academy of Political and Social Science*, 700(1), 112–123. <https://doi.org/10.1177/00027162221086263>
- Kuhn, T. S. (1970). *The structure of scientific revolutions* ([2d ed., enl]). University of Chicago Press.
- Lewandowsky, S., Ecker, U. K. H., Seifert, C. M., Schwarz, N., & Cook, J. (2012). Misinformation and Its Correction: Continued Influence and Successful Debiasing. *Psychological Science in the Public Interest*, 13(3), 106–131.
- Li, N., Hilgard, J., Scheufele, D. A., Winneg, K. M., & Jamieson, K. H. (2016). Cross-pressuring conservative Catholics? Effects of Pope Francis’ encyclical on the U.S. public opinion on climate change. *Climatic Change*, 139(3–4), 367–380. <https://doi.org/10.1007/s10584-016-1821-z>
- Li, N., & Molder, A. L. (2021). Can scientists use simple infographics to convince? Effects of the “flatten the curve” charts on perceptions of and behavioral intentions toward social distancing measures during the COVID-19 pandemic. *Public Understanding of Science*, 30(7), 898–912. <https://doi.org/10.1177/09636625211038719>
- Liedke, J., & Gottfried, J. (2022, October 27). *U.S. adults under 30 now trust information from social media almost as much as from national news outlets*. Pew Research Center. <https://www.pewresearch.org/short-reads/2022/10/27/u-s-adults-under-30-now-trust-information-from-social-media-almost-as-much-as-from-national-news-outlets/>
- Little, H. (2019). Communicating science: Lessons from a Twitterstorm. *Journal of Science Communication*, 18(04), L01. <https://doi.org/10.22323/2.18040101>

- Lyubovny, V. [djvlad]. (2023, May 2). Neil deGrasse Tyson: Calling Me a “Black Scientist” Ghettofies the Conversation (Part 8). Youtube.  
<https://www.youtube.com/watch?v=aN77kQ1A0-k>
- Macoubrie, J. (2006). Nanotechnology: Public concerns, reasoning and trust in government. *Public Understanding of Science*, 15(2), 221–241.  
<https://doi.org/10.1177/0963662506056993>
- Majid, A., Allred, R., Aminjavaheri, A., & Wang, E. (n.d.). *Scientific Influence and Social Prestige: A Twitter Network Analysis of Scientific Leaders*.
- Malhotra, Y., & Galletta, D. F. (1999). Extending the technology acceptance model to account for social influence: Theoretical bases and empirical validation. Proceedings of the 32nd Annual Hawaii International Conference on Systems Sciences. 1999. HICSS-32. Abstracts and CD-ROM of Full Papers, 14. <https://doi.org/10.1109/HICSS.1999.772658>
- Marshall, P.D., (2014.) *Celebrity and power: fame in contemporary culture*. 2nd ed. Minneapolis: University of Minnesota Press.
- Marshall, P.D., (2014.) Persona studies: mapping the proliferation of the public self. *Journalism*, 15 (2), 153-170.
- Marshall, P.D., Moore, C., Barbour, K., (2015). ‘Persona as method: exploring celebrity and the public self through persona studies’, *Celebrity Studies* vol. 6, no. 3, pp. 288–305.  
[doi:10.1080/19392397.2015.1062649](https://doi.org/10.1080/19392397.2015.1062649)
- Marshall, P. D., Moore, C., & Barbour, K. (2020). *Persona studies: An introduction*. (1st ed.) Wiley-Blackwell.

- Marwick, A. E., & Boyd, D. (2011). I tweet honestly, I tweet passionately: Twitter users, context collapse, and the imagined audience. *New Media & Society*, 13(1), 114–133.  
<https://doi.org/10.1177/1461444810365313>
- Masuda, H., Han, S. H., & Lee, J. (2022). Impacts of influencer attributes on purchase intentions in social media influencer marketing: Mediating roles of characterizations. *Technological Forecasting and Social Change*, 174, 121246.  
<https://doi.org/10.1016/j.techfore.2021.121246>
- Mehlenbacher, A. R. (2019). *Science communication online: Engaging experts and publics on the internet*. The Ohio State University Press.
- Miller, H. (1995). *The Presentation of Self in Electronic Life: Goffman on the Internet*.
- Miller, A., & Davidson, S. (2019). Co-ordinating meaning within a gender identity development service: What can the theory of the co-ordinated management of meaning offer clinicians working with young people, and their families, exploring their gender identities. *Clinical Child Psychology and Psychiatry*, 24(2), 322–337.  
<https://doi.org/10.1177/1359104519838313>
- Myers, Greg. (2022). *Writing Biology: Texts in the Social Construction of Scientific Knowledge*. The WAC Clearinghouse. <https://wac.colostate.edu/books/landmarks/myers/> (Originally published in 1990 by University of Wisconsin Press)
- Negură, P., Gașper, L. & Potoroacă, M. (2021). Trust in Institutions, Social Solidarity, and the Perception of Social Cohesion in the Republic of Moldova in the Early Phase of the COVID-19 Pandemic. *Comparative Southeast European Studies*, 69(4), 453-481.  
<https://doi.org/10.1515/soeu-2021-0034>

- Nelson, T., Kagan, N., Critchlow, C., Hillard, A., & Hsu, A. (2020). The Danger of Misinformation in the COVID-19 Crisis. *Missouri medicine*, 117(6), 510–512.
- Neubaum, G., & Krämer, N. C. (2017). Monitoring the Opinion of the Crowd: Psychological Mechanisms Underlying Public Opinion Perceptions on Social Media. *Media Psychology*, 20(3), 502–531. <https://doi.org/10.1080/15213269.2016.1211539>
- Newman, T. (2022). *Assessing the Scholarship of Public Engagement with Basic Science*. <https://doi.org/10.17605/OSF.IO/K93CJ>
- Newman, T. P., & Beets, B. (2023). Exploring the brand of science: Implications for science communication research and practice. *Journal of Science Communication*, 22(02). <https://doi.org/10.22323/2.22020205>
- Niskanen, K., Bosch, M., & Wils, K. (2018). SCIENTIFIC PERSONAS IN THEORY AND PRACTICE – WAYS OF CREATING SCIENTIFIC, SCHOLARLY, AND ARTISTIC IDENTITIES. *Persona Studies*, 4(1), 1–5. <https://doi.org/10.21153/ps2018vol4no1art748>
- Nunes, Joseph C., Andrea Ordanini & Gaia Giambastiani. (2021.) The concept of authenticity: What it means to consumers. *Journal of Marketing* 85(4). 1–20.
- Ohanian, R. (1990). Construction and Validation of a Scale to Measure Celebrity Endorsers' Perceived Expertise, Trustworthiness, and Attractiveness. *Journal of Advertising*, 19(3), 39–52. <https://doi.org/10.1080/00913367.1990.10673191>
- Page, R. (2012). The linguistics of self-branding and micro-celebrity in Twitter: The role of hashtags. *Discourse & Communication*, 6(2), 181–201. <https://doi.org/10.1177/1750481312437441>
- Partanen, L. (2020). *Keeping it real: Authenticity and relatability in the videos of two YouTube animators*. [Bachelor's thesis, University of Jyväskylä]

- Patterson, A. L. (2024). Make ‘em laugh: humor’s role in seeking science-based messages [M.S., Colorado State University] <https://hdl.handle.net/10217/238432>
- Paul, H. (2014). WHAT IS A SCHOLARLY PERSONA? TEN THESES ON VIRTUES, SKILLS, AND DESIRES. *History and Theory*, 53(3), 348–371.  
<https://doi.org/10.1111/hith.10717>
- Pietri, E. S., Johnson, I. R., Majid, S., & Chu, C. (2021). Seeing What’s Possible: Videos are more Effective than Written Portrayals for Enhancing the Relatability of Scientists and Promoting Black Female Students’ Interest in STEM. *Sex Roles*, 84(1–2), 14–33.  
<https://doi.org/10.1007/s11199-020-01153-x>
- Pinch, T. J., & Bijker, W. E. (1984). The Social Construction of Facts and Artefacts: Or How the Sociology of Science and the Sociology of Technology might Benefit Each Other. *Social Studies of Science*, 14(3), 399–441. <https://doi.org/10.1177/030631284014003004>
- Previs, K. K. (2016). Gender and Race Representations of Scientists in *Highlights for Children: A Content Analysis*. *Science Communication*, 38(3), 303–327.  
<https://doi.org/10.1177/1075547016642248>
- Quan-Haase, A., & Sloan, L. (2022). *The SAGE Handbook of Social Media Research Methods*. SAGE Publications Ltd. <https://doi.org/10.4135/9781529782943>
- Rainey, K., Dancy, M., Mickelson, R., Stearns, E., & Moller, S. (2018). Race and gender differences in how sense of belonging influences decisions to major in STEM. *International Journal of STEM Education*, 5(1), 10. <https://doi.org/10.1186/s40594-018-0115-6>

- Retzbach, A., & Maier, M. (2014). Communicating Scientific Uncertainty: Media Effects on Public Engagement With Science. *Communication Research*, 42(3), 429-456.  
<https://doi.org/10.1177/0093650214534967> (Original work published 2015)
- Robledo, A. (2023, October 6). Beyond X: Twitter's changed a lot under Elon Musk, here are some notable moves. USA Today.  
<https://www.usatoday.com/story/tech/news/2023/10/05/elon-musk-twitter-news/71066360007/>
- Rojek, Chris, (2001). *Celebrity: focus on contemporary issues*. London: Reaktion.
- Ruiz-Gomez, A. (2019). Digital Fame and Fortune in the age of Social Media: A Classification of social media influencers. *aDResearch ESIC International Journal of Communication Research*, 19(19), 08–29. <https://doi.org/10.7263/adresic-019-01>
- Sakas, M. E. (2023). I want you to panic: A discourse analysis on the ways memes express affective responses when shared to protest climate change [M.S., Colorado State University].  
<https://www.proquest.com/pqdtglobal/docview/2853707584/abstract/8C49425C4C9B4F78PQ/1>
- Saks, E., & Tyson, A. (2022, November 10). *Americans report more engagement with science news than in 2017*. Pew Research Center. <https://www.pewresearch.org/short-reads/2022/11/10/americans-report-more-engagement-with-science-news-than-in-2017/>
- Schwartz, S. H. (2012). An Overview of the Schwartz Theory of Basic Values. *Online Readings in Psychology and Culture*, 2(1). <https://doi.org/10.9707/2307-0919.1116>

- Schwartz, R., & Halegoua, G. R. (2015). The spatial self: Location-based identity performance on social media. *New Media & Society*, 17(10), 1643–1660.  
<https://doi.org/10.1177/1461444814531364>
- Sforza, L. (2023, February 15). Half in new survey believe news organizations mislead, misinform public. *The Hill*. <https://thehill.com/homenews/media/3858983-half-in-new-survey-believe-news-organizations-mislead-misinform-public/>
- Sherif, M., & Hovland, C. I. (1961). Social judgment: Assimilation and contrast effects in communication and attitude change. Yale Univer. Press.
- Singer, M. F., Callendar, C. L., Ma, X., & Tham, S. M. (2023). Differences in perceived influencer authenticity: A comparison of Gen Z and Millennials' definitions of influencer authenticity during the de-influencer movement. *Online Media and Global Communication*, 2(3), 351–378. <https://doi.org/10.1515/omgc-2023-0038>
- Singh, S., & Sonnenburg, S. (2012). Brand Performances in Social Media. *Journal of Interactive Marketing*, 26(4), 189–197. <https://doi.org/10.1016/j.intmar.2012.04.001>
- Smith, D. E. (1974). Women's perspective as a radical critique of sociology. *Sociological Inquiry*, 44(1), 7–13. <https://doi.org/10.1111/j.1475-682x.1974.tb00718.x>
- Sobande, F. (2019). How to get away with authenticity: Viola Davis and the intersections of Blackness, naturalness, femininity and relatability. *Celebrity Studies*, 10(3), 396–410.  
<https://doi.org/10.1080/19392397.2019.1630154>
- Sorensen, K. J. (2013). *Carl Sagan's COSMOS: The Rhetorical Construction of Popular Science Mythology*. [Dissertation, North Dakota State University]  
<https://hdl.handle.net/10365/26908>

- Steinke, J. (2005). Cultural Representations of Gender and Science: Portrayals of Female Scientists and Engineers in Popular Films. *Science Communication*, 27(1), 27–63. <https://doi.org/10.1177/1075547005278610>
- Stewart, M. (2014). Discourse Analysis of Media Coverage of Climate Change. [M.S., Colorado State University].
- Taniyev, O., Mayer, K. C., & Gordon, B. (2022). Monetizing Athlete Brand Image: An Investigation of Athlete Managers' Perspectives. *Journal of Applied Sport Management*. <https://doi.org/10.7290/jasm148967>
- Takahashi, B., & Tandoc, E. C. (2016). Media sources, credibility, and perceptions of science: Learning about how people learn about science. *Public Understanding of Science*, 25(6), 674–690. <https://doi.org/10.1177/0963662515574986>
- Tavani, J. L., Piermattéo, A., Lo Monaco, G., & Delouvé, S. (2021). Skepticism and defiance: Assessing credibility and representations of science. *PLOS ONE*, 16(9), e0250823. <https://doi.org/10.1371/journal.pone.0250823>
- Thon, F. M., & Jucks, R. (2017). Believing in Expertise: How Authors' Credentials and Language Use Influence the Credibility of Online Health Information. *Health Communication*, 32(7), 828–836. <https://doi.org/10.1080/10410236.2016.1172296>
- Tian, X., Minunno, F., Schiestl-Aalto, P., Chi, J., Zhao, P., Peichl, M., Marshall, J., Näsholm, T., Lim, H., Peltoniemi, M., Linder, S., & Mäkelä, A. (2021). Disaggregating the effects of nitrogen addition on gross primary production in a boreal Scots pine forest. *Agricultural and Forest Meteorology*, 301–302, 108337. <https://doi.org/10.1016/j.agrformet.2021.108337>

- Toscano, A. A. (2012). Analyzing Technology to Uncover Social Values, Attitudes, and Practices. In A. A. Toscano, *Marconi's Wireless and the Rhetoric of a New Technology* (pp. 31–55). Springer Netherlands. [https://doi.org/10.1007/978-94-007-3977-2\\_2](https://doi.org/10.1007/978-94-007-3977-2_2)
- Unger, J. B. (2011). Cultural Identity and Public Health. In S. J. Schwartz, K. Luyckx, & V. L. Vignoles (Eds.), *Handbook of Identity Theory and Research* (pp. 811–825). Springer New York. [https://doi.org/10.1007/978-1-4419-7988-9\\_34](https://doi.org/10.1007/978-1-4419-7988-9_34)
- Usakli, A., & Baloglu, S. (2011). Brand personality of tourist destinations: An application of self-congruity theory. *Tourism Management*, 32(1), 114–127. <https://doi.org/10.1016/j.tourman.2010.06.006>
- Veirman, M. D., Cauberghe, V., & Hudders, L. (2015). *Marketing Through Instagram Influencers: Impact Of Number Of Followers And Product Divergence On Brand Attitude*.
- Verma, N., Fleischmann, K. R., & Koltai, K. S. (2017). Human values and trust in scientific journals, the mainstream media and fake news. *Proceedings of the Association for Information Science and Technology*, 54(1), 426–435. <https://doi.org/10.1002/pra2.2017.14505401046>
- Vitak, J. (2012). The impact of context collapse and privacy on social network site disclosures. *Journal of Broadcasting & Electronic Media*, 56(4), 451-470. <https://doi.org/10.1080/08838151.2012.732140>
- Wang, L., & Forman-Katz, N. (2024, February 7). *Many Americans find value in getting news on social media, but concerns about inaccuracy have risen*. Pew Research Center.

<https://www.pewresearch.org/short-reads/2024/02/07/many-americans-find-value-in-getting-news-on-social-media-but-concerns-about-inaccuracy-have-risen/>

Webb, R. M., & Kurtz, L. (2022). Politics v. science: How President Trump's war on science impacted public health and environmental regulation. *Progress in molecular biology and translational science*, 188(1), 65–80. <https://doi.org/10.1016/bs.pmbts.2021.11.006>

Winner, L. (1980). *Do Artifacts Have Politics?*

Zhou Ting. (2021). The Media Images of Old Influencers on TikTok: A Multimodal Critical Discourse Analysis. *Journal of Literature and Art Studies*, 11(10).

<https://doi.org/10.17265/2159-5836/2021.10.013>

Zniva, R., Weitzl, W. J., & Lindmoser, C. (2023). Be constantly different! How to manage influencer authenticity. *Electronic Commerce Research*, 23(3), 1485–1514.

<https://doi.org/10.1007/s10660-022-09653-6>