A JOURNAL BY SISSA MEDIALAB

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Public (dis)trust in science in digital media environments

ARTICLE

How different science communicators use identity strategies to gain public trust: a study on astronomy and climate change issues on a Chinese knowledge sharing platform

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Abstract

Science communication has seen a trend of diverse communicators in recent decades, who adopt different identity strategies to gain audience trust. This study focuses on the strategies used by three different groups of science communicators, including scientists, citizens and institutions, as well as the potential effects that may arise from these different strategies in terms of audience trust through quantitative content analysis. The findings show that communicators have biases towards using different strategies. There are also significant differences in the trust effects generated by different strategies used by different science communicators in different science topics. This indicates that the effect of science communication varies for different groups of science communicators and different science topics, and it is difficult to generate a universally applicable model, which further corresponds to the current trend of 'diversification' and 'contextualization' in science communication research.

Keywords

Digital science communication; Diversity, equity, inclusion and accessibility in science communication; Science communication in the developing world

Received: 14th March 2024
Accepted: 10th August 2024
Published: 16th December 2024

1 ▪ Introduction

Traditional science communication — especially in the Chinese context, where it is widely known as 'science popularization (科普)' — has consistently been defined as the process of scientific information flowing from scientists to the public [Ren, 2019]. For instance, a very popular and influential definition of science communication in China is "the social phenomenon and process of how scientific knowledge spreads and communicates from its producers, usually scientists and experts, to the public" [Jin, 2018, p. 1]. However, with the development of the digital media environment, science communication, especially online, has complicated the simple relationship between scientists-producing and public-consuming [Yang, 2021]. There are many diverse communication relationships and science communicators, referred to as 'alternative science communicators' [Fähnrich et al., 2020], including citizen science communicators, activists, NGOs, enterprises, and government agencies [Yang, 2021; Windfeldt, 2020; Rödder, 2020]. Those diverse science communicators with different identities have also been found to adopt different discourse strategies to gain audiences' trust in their science communication practices [Yang, 2022b].

Among a series of discourse strategies adopted by science communicators, identity strategy — how to showcase themselves (self-disclosure) — is considered essential [Besley et al., 2019; Zhang & Lu, 2023]. According to Zhang and Lu [2023, p. 3], self-disclosure is important for science communicators both as a self-branding technique and to develop interpersonal relationships with audiences. The use of different identity strategies, such as personal or professional, can affect the audience's trust in science communicators [Besley et al., 2019; Yang & Yang, 2024], which is considered a core issue in science communication [Brewer & Ley, 2013]. To date, there has been limited systematic research on the use of identity strategies by different science communicators, as well as their possible communication effects, especially in the Chinese context. Thus, this paper attempts to address this oversight by analysing and comparing the identity strategies used by scientist communicators, citizen science communicators and institutional science communicators, as well as the trust effects of those identity strategies, using the topics of climate change and astronomy on Zhihu, the biggest online knowledge-sharing platform in China, as research objects.

2 ▪ Diverse science communicators and different discourse strategies

Traditionally, science communication is understood as the process of scientific and technological information flowing from scientists/experts to the public [Durant et al., 2000; Jin, 2018]. Especially in the Chinese context, where science communication is widely recognized as 'science popularization (科普)' and dominated by the 'deficit model', science communication is strictly defined as "the social phenomenon and process of how scientific knowledge spreads and communicates from its producers, usually scientists and experts, to the public" [Jin, 2018, p. 1]. In fact, such an understanding of the communicational relationship is widely present in existing definitions and research on science communication. For instance, according to Felt [2000], "scientists are seen as true producers of knowledge, which can be transmitted to the public through simplification: the publics are passive consumers of knowledge… Information flows unidirectionally from producers to receivers" (p. 10). According to Durant and colleagues [2000], science communication can be

understood as “a communication system composed of speakers, mediators, and audiences… The interrelationships in this system can be seen as representations between the scientific community (speakers), journalists (media), and the public (audience)” (p. 136).

Such views have not changed with the development of the science communication model. Research shows that even though the model of understanding of science communication has gradually shifted from the ‘deficit model’ to the ‘dialogue model’ and ‘engagement model’, understanding of the public’s ‘audience’ identity has remained constant [Simis et al., 2016; Yang, 2022a]. Even in the ‘public engagement with science’ model, the role of the public is still mostly seen as an active ‘audience’ that can provide feedback to scientists as communicators [Yang, 2022a]. Such stereotypical approaches to the communication relationships in science communication hinder a diverse understanding of science communication and limits the possibility of different actors playing different roles in the science communication system [Yang, 2022a].

Such bias has been somewhat corrected in recent years. In 2020, the *Journal of Science Communication* released a special issue called ‘alternative science communicators’, discussing the actors or social groups who can play the role of science communicators in addition to scientists, including activists, NGOs, and governmental agencies [Fähnrich et al., 2020; Windfeldt, 2020; Rödder, 2020; Lukanda, 2020]. Yang [2021, 2022a] also observed a large number of ‘citizen science communicators’ in online science communication, being those citizens who have no traditional scientific background or are not currently engaged in any scientific employment, but actively undertake scientists’ traditional societal responsibility to communicate and disseminate scientific knowledge or science-related information to other publics on digital platforms, as effective supplements to scientist science communicators. In addition to ‘citizen science communicators’, there are also a series of institutional science communicators, who do not appear in individual form. This type of science communicator is prevalent in the practice of science communication, yet previous studies have paid little attention to them [Schwetje et al., 2020]. Today, with the development of public relations-oriented science communication, institutional science communicators have gradually become important actors in the science communication ecosystem [Autzen & Weitkamp, 2019]. The emergence and prosperity of these alternative science communicators, including citizen science communicators and institutional science communicators, are due to the characteristics of audience empowerment, participatory culture, and connective action of the digital media environment [Nisbet & Scheufele, 2009; Luzón, 2013; Vicari & Cappai, 2016; Yang, 2022a]; as well as the enhancement of public awareness of engagement with science and the improvement of their scientific literacy [Yang, 2022a]. As a result, science communication is no longer as simple as the communicational relationship between ‘scientists as communicators and the public as audiences’ [Yang, 2022a].

Furthermore, different science communicators have also been found to tend to use different discourse strategies in science communication practices to defend their own views [Lindgreen, 2003; Fawcett et al., 2017]. For instance, Yang [2022b] found that considering the topic of GMOs, citizen science communicators tend to use ‘lay logic’, which means the unscientific, and non-deductive logic based on individual experience [Williams, 1983], with more rhetoric, while scientist science communicators tend to use direct scientific knowledge and logic with less rhetoric. The differences in identity have a profound impact on how different science communicators perceive their target audience and what discourse strategies they tend to adopt [Lucas et al., 2015; Yang & Yang, 2024]. However, research on

this perspective, relevant to the diversity of science communicators, is still in its early stages, and our understanding of the logic behind it is still limited.

3 ▪ Identity strategies, self-disclosure, and trust acquisition

As discussed above, different science communicators tend to adopt different discourse strategies to defend their stance and attract audiences' trust in science communication practice, therefore these discourse strategies are often referred to as trust discourse strategies or just trust strategies [Yang, 2022b]. Among those diverse trust strategies, identity strategy — how one presents oneself — is considered essential in attracting audiences' trust in science communication [Altenmüller et al., 2023; Zhang & Lu, 2023]. According to Camilleri and Malewska-Peyre [1997], identity strategy refers to a series of rhetorical and discourse strategies used by the speaker or writer to shape who they are and what their characteristics are in the process of communication — also known as 'self-disclosure strategies' [Archer, 1980; Sprecher et al., 2018]. In the science communication process, different communicators have been found to use different identity strategies [Yang & Yang, 2024]. For instance, when using social media to directly address their audience (rather than through traditional media intermediaries), scientists tend to use two different identity strategies: professional self-disclosure strategies (sharing professional experiences of research related to a scientist's career) and personal self-disclosure strategies (sharing personal interests, hobbies, and other non-science-related information) [J. Kim & Song, 2016; Zhang & Lu, 2022, 2023].

Among these two kinds of identity strategies, scholars have further found that, under the influence of 'collective ideology', scientists often tend to directly or indirectly express their professional identity (professional self-disclosure strategies) in the process of science communication, to distinguish themselves from the public or other knowledge groups — this is also known as 'boundary-work' behaviour [Gieryn, 1983; Yang, 2021; Horst, 2021]. Compared to scientists, citizen science communicators have been found to favour 'similar identity strategies' or 'personal self-disclosure strategies', highlighting themselves as ordinary persons that share similar identities with their audience to generate a 'bonding effect' [Yang, 2022b]. Other studies indicate that depersonalization (without using active voice through pronouns such as I and we) is also common in science communication, especially in practices led by scientists [Yang, 2021].

However, due to the significant influence of the communicator's identity characteristics on the outcome of the communication process, no matter what identity strategy is used, it is always considered an important factor affecting audience acceptance in science communication [Zhang & Lu, 2022; N. Kim et al., 2024], especially in relation to trust. Firstly, audiences with different identities have varying levels of trust in science communicators. Many studies have found that although we are currently in an era of diversified identities of science communicators, the audience still tends to trust scientists with expert identities more [Bogert et al., 2024]. Similar science communicators using different identity strategies can also affect the trust effect of the audience. For example, research has found that when citizen science communicators forcefully reveal their expert identity, it may actually have a negative impact on audiences' trust [Yang & Yang, 2024]. Therefore, using appropriate self-disclosure strategies is also believed to help the audience accept scientific claims as 'true', and further behave in accordance with the scientific claim or its implications, which is considered to be the foundation for trust [Altenmüller et al., 2023; N. Kim et al., 2024].

Trust, as a vital element in science communication [Brewer & Ley, 2013; Lucas et al., 2015], relates to the audiences' assurance in the character, ability, strength, or truth of the communicators [Hardin, 2002]. In the communication process, the generation of trust is also believed to be based on different mechanisms. For instance, Zucker [1986] believes that trust can be divided into three different mechanisms, based on process, characteristics, and institution. Peters and colleagues [1997] believe that the generation of trust is based on three different dimensions: knowledge and expertise; openness and honesty; concern and care. These different trust mechanisms can also correspond to different identity strategies, such as 'knowledge and expertise' corresponding to professional self-disclosure strategies, while 'concern and care' tends to correspond to 'similar identity strategies' or 'personal self-disclosure strategies'. Therefore, based on the above analysis, we can infer that using different identity strategies may produce different trust effects in science communication practices. But do the identity strategies used by different science communicators have different effects on trust? There is currently a lack of systematic research on this issue. Furthermore, many studies have also pointed out that specific identity strategies may have completely different effects in the face of different scientific issues, whether controversial or non-controversial (or so-called hard science). For instance, Goodwin and Dahlstrom [2014] found that non-professional identity strategies may be more effective in climate change communication; while other studies find that faced with communication about math or physics — hard non-controversial science — expert identities may be most effective [Kee et al., 2021]. Therefore, it is necessary to ask: do the trust effects of these identity strategies vary between different science communication topics, such as among controversial scientific issues and 'hard science' issues? These questions have not been fully answered yet, and they form the core issues investigated by this study.

4 ▪ Methods

4.1 ▪ *Sample and data*

This study uses Zhihu as an example of a Chinese digital media environment. Founded in 2010, Zhihu is now the biggest knowledge-sharing network platform (or Q&A platform) in China. In terms of functionality, it is like Quora, emphasizing the sharing of knowledge among users, hence it is also known as the Chinese version of Quora. By the end of 2023, there were more than 44 million questions and 2,400 million answers on Zhihu, while monthly active users exceeded 106 million. On Zhihu, there are more than 1,000 active science-related sections, which shows that it is a popular platform for science communication in China. To compare the effectiveness of trust strategies for different types of scientific topics (hard science and controversial science), we selected the active science sections of 'astronomy' and 'climate change' on Zhihu as the analysis objects. As of February 2024, there were more than 5,000 valid questions, 138,000 answers and 2,100 million views in the astronomy section and 4,000 valid questions, 115,000 answers and 1,400 million views in the climate change section. Among the more than 138,000 and 115,000 answers in these two sections, this study mainly focused on the *Excellent Answers* (精华内容), which are those selected by the platform in each topic based on numbers of likes, comments, and content quality of the answers, combined with comprehensive artificial and algorithmic measurement. The selected *Excellent Answers* all have higher quality content, contain more information, and have the greatest number of likes and comments across the entire section.

Therefore, they are also the most popular and influential answers in each section. There were 802 and 783 *Excellent Answers* provided by 653 different users in the astronomy and climate change sections on Zhihu, respectively. However, it should be noted that although *Excellent Answers* are guaranteed in terms of content quality, focusing solely on them may also lead to overlooking more grassroots, civilian, and lower-quality answers. This is an unavoidable bias in our sample selection.

To explore the effects of the different trust strategies used by different science communicators, this study focuses on three kinds of science communicators: citizen science communicators, scientist science communicators, and institutional science communicators. All the identities of the providers of *Excellent Answers* in these two sections were manually tagged as scientist, personal non-scientist (citizens), organization or institution, or unknown, according to the identity information on the user's homepage and/or mentioned in their answers. Most of the authors of the *Excellent Answers* have personal identity descriptions on their homepage on Zhihu, and many have obtained blue marks through Zhihu's review process. Zhihu issues blue marks to those users with verified identities (including educational background and employment situation) to prove that the identities and identity certificates provided are accurate. Therefore, in our samples, for users with blue marks or very clear identity information (*N=478*), their identities could be easily confirmed. For those users who did not provide identity information or who could not be authenticated, the authors sent identity inquiry messages through the private message function on Zhihu to determine whether they were scientists (*N=175)*. For those users who did not respond (*N=97*), we tried to determine their identity based on their answer content, in which some indicated their educational experience or work status (*N=8*). Those users where we could not determine their identity were marked as 'unknown (users whose identity could not be confirmed)' (*N=89*).

In this study, a scientist science communicator is defined as a person who has studied or is studying for a doctoral degree related to science and is engaged in work related to science and provided scientific answers on Zhihu. If a user had received some science education but was currently engaged in a profession unrelated to science, then from a professional identity perspective, we did not define them as scientists. For instance, an answer provider on Zhihu named 'Star River Lonely Journey' claimed to be a doctoral student in astrophysics at Sun Yat-sen University and had obtained the blue mark, thus he was recognized as a scientist and science communicator. Citizen science communicators are those scientific answers providers who do not have a professional scientific background and do not engage in professions related to scientific research. For instance, a scientific answer provider in the climate change section on Zhihu named 'Extraordinary Youtiao' was a financial practitioner, thus he was labelled as a citizen science communicator. Institutional science communicators refers to non-individual scientific answer providers who appear in the form of groups or registered companies, such as the account of Observer Network, which is a famous media company. It has been labelled as an institutional science communicator. Among the 802 *Excellent Answers* in the astronomy section, 145 were provided by scientist science communicators, 543 by citizen science communicators, 73 by organization accounts, and 40 by users whose identity could not be confirmed. In the climate change section, 139 were provided by scientist science communicators, 523 by citizen science communicators, 72 by organization accounts, and 49 by unknown users. Thus, citizen science communicator was the most prominent type of science communicator on Zhihu.

4.2 ▪ *Coding*

To explore the differences in the use of trust strategies by different science communicators and their communication effects, based on the trust classification proposed by Zucker [1986] and Peters and colleagues [1997], this study summarizes trust into the following three types: trust based on expertise; trust based on moral character; and trust based on identity similarity. These three different mechanisms can point to three different identity strategies: *expert identity strategy*, which emphasizes one's professional identity in the communication process to gain trust; *quality identity strategy*, which emphasizes or shapes one's admirable moral qualities during the communication process, such as honesty, openness, and trustworthiness; and *intimate identity strategy*, which emphasizes a similar identity and life experience to the audience in the communication process to gain trust. Research also shows that science communicators may not be inclined to directly reveal their professional identity, such as saying "I am a PhD graduate from XX major at XX University". Instead, they tend to indirectly reflect their professional identity through a terminology or professional discourse (such as using jargon, professional charts, or citations that may be difficult for laypeople to understand) [Yang, 2023a]. Therefore, we further divide these three identity strategies into 'direct' and 'indirect'. The identity strategies coding table can be found in Table 1.

We first randomly extracted 100 answers from the two sections for inter-coder reliability testing. The test results show that the Krippendorff's alpha values of the six coding contents are all above 0.8, which are within an acceptable range.

In social media research, due to the interactive possibilities provided by digital platforms, 'likes' are the most direct indicator for exploring trust as users' active participatory behaviours [Stone & Can, 2020]. According to Johnston and Taylor [2018, p. 6], at the individual level, levels of trust can be measured through behavioural engagement outcomes. On social media platforms, 'likes' are the most common engagement behavioural outcomes of users with communicators and the content they create [Zhao et al., 2018]. Although there is a difference between a 'like' and 'trust', social media users are generally found to give their likes to the content they trust most, which means they can legitimately be used as indicators of trust [Li et al., 2014; Stone & Can, 2020]. In this study, although we focus on *Excellent Answers*, there are still significant differences in the number of likes between them. Some can reach thousands of likes, while some only have a few dozen. This also indicates the varying levels of trust that the audience has towards these answers. Therefore, in this study on Zhihu, a digital knowledge sharing network, it makes sense to use the number of likes for each answer as a criterion for evaluating trust.

5 ▪ Findings

5.1 ▪ *Selective identity policy use among different science communicators*

The coding results show that there are clear differences in the use of identity strategies among different types of science communicators (Table 2). In the two sections, both the scientist science communicators and institutional science communicators tend to use the expert identity strategy. In the astronomy section, this usage ratio of expert identity strategy reaches 85%.[1] In addition, for scientist science communicators, the proportion of using

1. Due to the possibility of using multiple identity strategies for the same answer, the sum of the values may exceed 100% for a specific type of science communicator's strategy proportion.

Table 1. Coding frame of the trust-identity strategies used by different science communicators on Zhihu.

Trust-identity strategies		Definition	Example
Expert identity strategy	direct way	Directly emphasizing one's professional identity or educational background through language	"As a PhD in global climate change and carbon emissions, I believe there is still uncertainty in this conclusion". (Climate change section, scientist science communicator, No.18)
	indirect way	Implying one's professional identity through a series of indirect discourse methods	"The net (shortwave) radiation heat power released by the human body into the environment can be expressed as P1=A εσ (Tskin4 Tenv4) where A=0.5 m ^ 2 is the effective contact area between the human body and the outside world. ε is the effective emission coefficient of the skin (approximately 0.98), σ = 5.67 x 10 ^ -8kg s ^ -3K ^ -4 is the Stefan Boltzmann constant". (Climate change section, scientist science communicator, No.27)
Quality identity strategy	direct way	Directly emphasizing one's excellent moral qualities through language	"My answer has gone viral. It must be my sincerity and honesty that moved everyone". (Astronomy section, citizen science communicator, No.72)
	indirect way	Implying one's excellent moral qualities through a series of indirect discourse methods	"I am not sure about this issue either, so I consulted an expert from the observatory. I also welcome everyone to openly discuss or criticize my views in the comment section". (Astronomy section, citizen science communicator, No.106)
Intimate identity strategy	direct way	Directly emphasizing one's similarity to the audience as an ordinary person through language	"Just like you, I am just an ordinary astronomy enthusiast". (Astronomy section, citizen science communicator, No.203)
	indirect way	Implying similarity between oneself and the audience through a series of indirect discourse methods or showcasing one's life experiences as an ordinary person	"Just like buying groceries on a daily basis, we can actually eat less meat to contribute to climate change to the best of our ability". (Climate change section, scientist science communicator, No.66)

quality identity strategy is slightly higher than for intimate identity strategy. But unlike scientist science communicators and institutional science communicators who tend to use expert identity strategies, citizen science communicators tend to use identity strategies more evenly and diversely. Although they may also lean towards using expert identity strategies (35.7% in astronomy and 36.5% in climate change), this proportion does not exclude the other two identity strategies. In the climate change section, the proportion of

using quality identity strategy and intimate identity strategy among citizen science communicators is identical (23.9%), which better reflects their balance and diversity in using the identity strategy of citizen science communicators. In terms of cross-group comparison, the proportion of using quality identity strategy is relatively similar between citizen science communicators (17.9% in astronomy and 23.9% in climate change) and scientist science communicators (18.6% in astronomy and 23.9% in climate change), but it is evident that citizen science communicators prefer to use intimate identity strategy (26.2% in astronomy and 23.9% in climate change) more than scientist science communicators (17.2% in astronomy and 8.7% in climate change).

In the process of using identity strategies, all three kinds of science communicators clearly tend to use indirect rather than direct expressions. This is evident in every type of strategy expression in every group of science communicators. This may be related to China's unique cultural environment, which emphasizes humility, subtlety, and caution [Gao & Ting-Toomey, 1998]. Thus, communicators may be more inclined to indirectly express their advantageous identity, rather than directly spelling it out. It can also be found that although we distinguished between astronomy (a typically hard science topic) and climate change (a typically controversial scientific topic), it seems that there is no significant difference in the use of different identity strategies by these science communicators between topics. The ranking of the proportion of usage of different types of identity strategies of all three kinds of science communicators is almost identical between the two topics (except in the climate change section where the proportion of quality identity strategy and intimate identity strategy used by citizen science communicators is the same). Therefore, we can summarize that different science communicators have different biases in their use of identity strategies. In both the astronomy and climate change sections, scientist science communicators and institutional science communicators are more inclined to use the expert identity strategy, while citizen science communicators — who are slightly inclined to use this strategy — are clearly more diverse and balanced in their use of identity strategies. Regardless of the identity strategies used, for Chinese science communicators, they are all significantly more inclined to use indirect rather than direct expressions.

5.2 ▪ *The trust effects of identity strategies: differences between science communicator and topic*

To further examine the trust effects of different identity strategies adopted by different science communicators, we conducted regression analysis using the number of likes of each answer as the dependent variable and the uses of identity strategies as the independent variables. As discussed above, likes can be used to evaluate a user's trust in a particular answer. Therefore, the exploration of the relationship between this independent variable and the dependent variable can help us further analyse what kind of identity strategy use will lead to more audiences' trust. Table 3 shows that the use of identity strategies has obvious structural differences in the effectiveness of gaining audience trust for different topics (different levels of shading indicate the degree of significance, with darker colours indicating higher significance). In the astronomy section, data suggests that the use of all three types of identity strategies can to some extent predict the trust effect. However, when it comes to specific types of communicators, the effect varies. For scientist science communicators in the astronomy section, the use of intimate identity strategy and quality identity strategy can predict the level of trust to some extent, while the expert identity is irrelevant. For citizen

Table 2. Different identity strategies used by different science communicators on Zhihu.

Astronomy	Expert identity strategy		Quality identity strategy		Intimate identity strategy	
	Direct way	Indirect way	Direct way	Indirect way	Direct way	Indirect way
Scientist science communicator (N=145)	124 (85.5%)		27 (18.6%)		25 (17.2%)	
	17 (13.7%)	116 (93.6%)	2 (7.4%)	27 (100%)	0 (0%)	25 (100%)
Citizen science communicator (N=543)	194 (35.7%)		97 (17.9%)		142 (26.2%)	
	17 (8.8%)	182 (93.8%)	4 (4.1%)	96 (99.0%)	6 (4.2%)	139 (97.9%)
Institution science communicator (N=73)	66 (90.4%)		2 (2.7%)		5 (6.8%)	
	21 (31.8%)	66 (100%)	0 (0%)	2 (100%)	0 (0%)	5 (100%)
Climate change	Expert identity strategy		Quality identity strategy		Intimate identity strategy	
	Direct way	Indirect way	Direct way	Direct way	Indirect way	Direct way
Scientist science communicator (N=138)	107 (77.5%)		33 (23.9%)		12 (8.7%)	
	26 (24.3%)	96 (89.7%)	6 (18.2%)	29 (87.9%)	3 (25.0%)	11 (91.7%)
Citizen science communicator (N=524)	191 (36.5%)		125 (23.9%)		125 (23.9%)	
	12 (6.3%)	184 (96.3%)	14 (11.2%)	121 (96.8%)	23 (18.4%)	109 (87.2%)
Institution science communicator (N=71)	56 (78.9%)		7 (9.9%)		8 (11.3%)	
	14 (25.0%)	55 (98.2%)	1 (14.3%)	7 (100%)	1 (12.5%)	8 (100%)

science communicators in the astronomy section, only the use of expert identity strategy can significantly predict, to a certain extent, the audiences' trust in them. For institutional science communicators, the uses of three strategies are not significant. It seems that in astronomy topics, the audience trusts scientist science communicators more when they exhibit intimate and quality identities, as well as citizen science communicators who exhibit expert identities, while the public is less concerned about how institutional science communicators express their identities. However, in the climate change section, the identity strategies that affect the trust acquisition of different science communicators are different. In the climate change section, it seems that only the use of quality identity strategies can slightly predict audience trust, while the other two are both insignificant. Specifically, for scientist science communicators in the climate change section, only the use of quality identity strategies can predict audience trust in them. For citizen science communicators, as in the astronomy section, only the use of expert identity strategies can significantly predict audience trust, but the difference is that this prediction is negative in relation to climate change. For institutional science communicators, the uses of three strategies are also insignificant. It seems that on climate change, the audience tends to trust scientist science communicators who better demonstrate their quality identity, as well as citizen science communicators who do not demonstrate their expert identity, and they are also less concerned about how institutional science communicators express their identities.

It can be observed that although the topic differences between 'hard' and controversial science does not affect the bias of the use of identity strategies of different science

communicators, it clearly affects the trust engendered by those identity strategies. It seems that for astronomy, a typical 'hard' science topics, identity strategies have a more significant and diverse impact on trust effectiveness. This may be because, in the science communication process of astronomy, knowledge (content) is relatively fixed, so the knowledge content that the audience can receive is mostly similar or consistent [Hedges, 1987]. In this case, the form of packaging content strategies, such as identity strategies, may have a greater impact on final trust effectiveness. For climate change, as a typical controversial scientific issue, such effectiveness seems to be less significant, and only the special quality identities of specific science communicator groups have a significant impact on audiences' trust, such as the quality identity strategy of scientist science communicators and the expert identity strategy of citizen scientists as communicators (negative). Recent research has found that in controversial scientific issues, such as climate change, audiences do not expect non-scientist groups to 'pretend' to be experts, as this could lead to negative perceptions of such behaviour [Yang & Yang, 2024]. Meanwhile, in relation to controversial scientific issues, the audiences' trust in scientists is gradually decreasing, especially when there is suspicion of potential personal and unfair bias around such topics, including genetically modified food and climate change [Leiserowitz et al., 2013; Lecture, 2016; Yang, 2023b]. Therefore, in this situation, scientists who demonstrate their quality identity as science communicators may be more likely to attract audiences' trust. For institutional science communicators, these identity strategies are insignificant. On the one hand, this may be due to limited data in this study, and on the other, more importantly, the communication content of institutions often does not appear in an individualized form. Identity strategies have a smaller packaging effect on their content compared to the other two types of individualized science communicators. Therefore, the use of identity strategies may not be as significant for institutional science communicators.

In summary, the use of various identity strategies can impact trust acquisition in science communication to a certain extent, but this effect varies between different science communicators and topics.

6 ▪ Discussion: context of identity strategies and their trust effects

Based on the analysis of the use of identity strategies by different science communicators and their trust effects, it can be found that the use of identity strategies has an impact on the audiences' trust, and this results in certain biases among different kinds of science communicators. This to some extent supplements current research on 'self-disclosure' in science communication, which mainly focuses on the identity strategies used by single type communicators and their communication effectiveness, such as scientist science communicators [Besley et al., 2019; Zhang & Lu, 2023]. The analysis of the use of identity strategies and their trust effects for various types of science communicators reveals that the final communication effectiveness of those identity strategies may be situational and cannot be generalized across all science communication. This is also in line with the current trend of diversification research in science communication, such as the diverse identity of communicators [Yang, 2021; Windfeldt, 2020; Rödder, 2020]; diverse cultural environment for science communication [Medin & Bang, 2014; Trench, 2021; Yang & Yang, 2024]; diverse science communication strategies [Hyland-Wood et al., 2021; Trench, 2021]; and diverse

Table 3. The impact of different identity strategies on audience trust on Zhihu.

	Expert identity strategy	**Quality identity strategy**	**Intimate identity strategy**
Total data	.036	.057**	.058**
Astronomy-total	.057**	.062*	.079**
Astronomy — Scientist science communicator	.058	.153*	.288***
Astronomy — Citizen science communicator	.074**	.056	.197
Astronomy — Institution science communicator	.051	-.044	-.020
Climate change — total	-.017	.067*	.026
Climate change — Scientist science communicator	.087	.192***	-.043
Climate change — Citizen science communicator	-.022**	.042	.031
Climate change — Institution science communicator	.083	-.074	-.073

*p < .05; **p < .01; ***p < .001

science communication audiences [Luzón, 2013; Longnecker, 2023]. Scholars should not ignore the differences in situations or contexts to construct or assume a universal communication template or formula for science communication. Irwin and colleagues summarize this as a 'contextualized model' of science communication, which suggests placing science and technology studies in a more macro cultural context and enhances the importance of reflexivity and the perspective of cultural analysis in science communication research [Irwin, 2001, 2006; Irwin & Michael, 2003; Irwin et al., 2013]. This view no longer emphasizes the advantages of 'engagement models' or 'dialogue models' for 'deficit model' but highlights that different models may have different effects in different contexts. The present research may could provide some empirical support for this argument.

When analysing what kinds of identity strategies could produce better trust effects in science communication, scholars must also fully consider the differences involved in the topics and in the identities of the communicators. For example, for scientist science communicators, the quality identity strategy and intimate identity strategy may be more effective in arousing audience trust; while for citizen science communicators, the expert identity strategy may be more effective. Furthermore, such effects may also vary depending on the science communication topics. For instance, for citizen science communicators, an expert identity

strategy may always have an effective impact on audience trust. In the field of astronomy, and maybe other similar hard science fields, the impact may be positive; while in the climate change and other controversial technological issues, it may be negative. Therefore, we cannot provide a universal answer about how to effectively promote audiences' trust through use of identity strategies, as previous research on self-disclosure in science communication has done [Besley et al., 2019; Zhang & Lu, 2023], especially in the current context of the diversity of science communicators [Yang, 2021; Windfeldt, 2020; Rödder, 2020].

Upon closer examination of the reasons for the differences in those trust outcomes, in addition to those discussed above, it may also include differences in audience psychological distance and information processing needs. As the audience for science communication, the public has been found to have a greater psychological distance perception towards scientists as communicators, compared to citizen science communicators [Yang, 2021; Yang & Yang, 2024; Većkalov et al., 2024]. At the same time, they also have a greater psychological distance perception towards some hard science fields that are not frequently encountered in daily life, such as geology and astronomy, compared to some controversial technological topics that are significantly related to their daily lives, such as climate change or genetically modified organisms [Loy & Spence, 2020; Većkalov et al., 2024]. In situations where there is a perception of greater psychological distance, using an intimate identity strategy and striving to express a similar identity between the communicator and the audience, is considered to be effective in narrowing or reducing such psychological distance, so that the communication content can reach the audience more effectively, generating trust or other psychological effects [Loy & Spence, 2020; Chu et al., 2021]. Therefore, for scientist science communicators in astronomy, the most effective type of identity strategy is the intimate one.

Although citizen science communicators have begun to clearly intervene in science communication practices, the content they create has been found to be far weaker in terms of information capacity and depth than the content created by scientists [Yang, 2021, 2022b; Yang & Yang, 2024]. Therefore, we can assume that compared to being faced with science communication content created by scientists characterised by jargon, tables, and statistics, audiences are more likely to take a non-serious path to process information when faced with content created by citizen science communicators who prefer to use humorous and witty methods to communicate, and rely more on some surface and obvious clues to judge the feasibility of the information, such as a more direct communicator identity, rather than scrutinizing the qualities or life experiences embedded in the communication content [Yang, 2021]. The research also indicates that when facing citizen science communicators, the more significant and effective strategy for influencing audiences' trust is the expert identity strategy, whether it is the positive attraction in the astronomy section or the negative impact in the climate change section. The findings also indicate that the effect mechanism in science communication varies for different groups of science communicators and different science topics, and it is difficult to devise a universally applicable model. This further corresponds to the current trend of 'diversification' and 'contextualization' in science communication research. These explanations represent tentative speculations from our research findings. Demonstrating the accuracy of these explanations will need further research.

7 ▪ Conclusion

In the context of diverse science communicators, this study analysed the use of identity strategies and the trust effects generated by three different groups of science communicators on Zhihu — scientists, citizens, and institutional science communicators — on two different science communication topics: astronomy and climate change. Results indicate that different communicators have different usage biases towards different identity strategies. For instance, scientist science communicators and institutional science communicators are both more inclined to use the expert identity strategy, while citizen science communicators, although slightly inclined to use this strategy, are more diverse and balanced in their use of identity strategies. Regardless of the identity strategies used, Chinese science communicators are clearly more inclined to use indirect rather than direct expressions. There are also significant differences in the trust effects generated by different identity strategies used by different science communicators in different science communication topics. For astronomy, a typical 'hard' science topic, identity strategies have a more significant and diverse impact on trust effectiveness, while for climate change, a more scientifically controversial topic, there are relatively few identity policies that can directly generate trust effects. For citizen science communicators, it seems that expert identity strategies can have a more significant impact; while for scientist science communicators, it seems that quality identity strategies and intimate identity strategies are more effective.

But this is not a direct call for scientists or citizen science communicators to abandon their identity strategy preferences (such as expert identity strategy for scientists) or adopt new identity strategies, because the results may stem from a combination of multiple factors. However, we do suggest all science communicators consider more diverse identity strategy possibilities when creating science communication content, which may produce unexpected results. There are also several shortcomings in this study: focusing solely on one platform may give our data a certain bias; and the uniqueness of Chinese culture, such as its emphasis on subtlety and introversion, may prevent this research from being more effectively extended to other cultural environments. These are all things that we need to further improve and overcome in future research.

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How to cite

Yang, Z., Huang, Y., Yang, T. and Yu, T. (2024). 'How different science communicators use identity strategies to gain public trust: a study on astronomy and climate change issues on a Chinese knowledge sharing platform'. *JCOM* 23(09), A08. https://doi.org/10.22323/2.23090208.

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