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Scientific Knowledge Communication in Online Q&A Communities: Linguistic Devices as a Tool to Increase the Popularity and Perceived Professionalism of Knowledge Contributions

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Abstract

With the popularity of question-and-answer (Q&A) communities, widespread dissemination of scientific knowledge has become more viable than ever before. However, those contributing high-quality professional scientific knowledge are confronted with the challenge of making their contributions popular, since nonexpert readers may not recognize the importance of their contributions given the massive amount of information available online. In this study, we show that nonexpert readers are capable of evaluating the professionalism of content contributed in such communities as well as experts. However, we discovered that a salient discrepancy exists between the content nonexperts favor and the content they perceive as professional. In line with studies that have suggested that writing techniques play an important role in how expert content is received by laypersons, we investigated how the use of linguistic devices affects both the perceived professionalism and the popularity of contributions in Q&A communities. Based on both secondary data and a scenario-based survey, we identified specific linguistic devices that can increase content popularity without reducing perceived professionalism. Additionally, we revealed linguistic devices that increase popularity at the expense of perceived professionalism in this context. Finally, we conducted a laboratory experiment to more firmly establish the causal effects of the linguistic device use. The triangulated findings have important implications for both research and practice on communicating scientific knowledge in Q&A communities.

Keywords: Q&A Communities, Scientific Knowledge Communication, Science Popularization, Linguistic Device, Popularity, Professionalism

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1 Introduction

Question-and-answer (Q&A) communities, such as Reddit and Quora in the United States and Zhihu in China, have become massively popular in recent years. Reddit, for example, reports 330 million users, Quora claims it has 300 million users, and Zhuhu had 180 million users as of June 2018. These online platforms are increasingly used as a forum for providing and accessing knowledge. With the participation of scientists and experts, these communities endeavor to offer avenues for the communication and

dissemination of scientific knowledge (Shen, Shen & Fan, 2009; Yang, Qiu, Gottipati, Zhu, Jiang, & Sun, 2013). Compared with offline channels, online channels extend the potential audience reach beyond the limits imposed by geographical boundaries and, therefore, greatly expand the potential influence of scientific communication (Zhang, 2012). Indeed, such use of online social media is deemed a key means to popularize science and to educate the public (Claussen, Cooney, Defilippi, Fox, Glaser, & Hawkes 2013; Nisbet & Scheufele, 2009; Yeo, 2014). [1]

However, ensuring that professional scientific knowledge is well received by a mass audience is a challenging task (Brownell, Price, & Steinman, 2013). Studies have suggested two reasons for this. First, given the obscure technical details often embedded in professional scientific writing, laypersons (i.e., nonexpert readers) may be unable to distinguish professional scientific writing from fake scientific content (Shachaf, 2009; Fichman, 2011). Second, users may appreciate other values more than the professional quality of online content. For instance, ordinary users often judge the "best answers" to be those with socioemotional value appeal rather than a high level of accuracy or technical details (Kim, Oh, & Oh, 2007; Kim & Oh, 2009; Radford, Connaway, & Mikitish, 2017). Consequently, there could be a discrepancy between professional content and popular content, especially given that existing content recommendation systems (such as Quora's in the US and Zhihu's in China) are based on number of votes by primarily nonexpert users (Jin, Huang, & Wang, 2017; Welbourne & Grant, 2016). Inconsistency between the professional quality and popularity of online content can undermine the public accessibility of professional scientific knowledge, thus impeding its diffusion through Q&A communities.

To find out whether these suppositions are true and to set the context and focus of our study, we first conducted an exploratory study on a popular Q&A community that aims to disseminate scientific knowledge based on secondary data analysis and expert and ordinary user assessments of the professionalism of content (details available in Section 2). In essence, we found that nonexpert users assess the professionalism of knowledge content in the Q&A community similarly to experts. This suggests that ordinary, nonexpert users of the Q&A community can distinguish professional knowledge content from nonprofessional knowledge content. However, we also observe salient discrepancies between popular content and the content that users deem professional. This suggests that even when a piece of knowledge content is perceived as being of high professional quality, it might not be favored by ordinary users and thus might not become popular. We attempted to discover what differentiates knowledge content with high perceived professionalism that does become popular from content that does not.

Insofar as users are likely to form their perceptions (e.g., of professionalism and likeness) based on what they see in the Q&A communities, we believe that writing techniques, being a feature of knowledge content that is directly discernable to the lay audience, have the potential to influence whether content is perceived as professional as well as whether it becomes popular. Research has demonstrated how writing techniques can create a gulf between scientific readers and lay readers (Calsamiglia, 2003). Because scientific writing often contains technical details not easily comprehensible to the general public, using appropriate textual or linguistic devices to craft such writing may help make scientific knowledge more accessible and acceptable to lay audiences. Indeed, popularizing scientific writing entails the reformulation of professional content for the nonspecialist public via linguistic means that support popularization, especially in the Web 2.0 era (Gotti, 2014; Zhang, 2012; Calsamiglia, 2003). Thus, paying attention to how knowledge content is written through the use of different linguistic devices could serve as a signal to lay audiences, indicating whether the content is professional and whether it is appealing.

Thus, in this study, we investigate how the use of linguistic devices can help scientific knowledge gain popularity in Q&A communities without compromising the public perception of its professional scientific quality. We believe that this fills an important gap in the literature on Q&A communities. Research in this area has primarily sought to reveal the factors that contribute to popularity ranking (e.g., in terms of votes received) of knowledge content (e.g., Jin et al., 2017; Rughiniș, Rughiniș, Matei, & Nenciu, 2014; Stoddard, 2015). However, focusing on popularity is far from a complete approach to the topic. When content is popular but is perceived as not professional, it may risk being simply treated as entertainment rather than scientific knowledge that should be incorporated into one's knowledge base. Moreover, when public users perceive that most of the content in a Q&A community is not highly professional, participation in the community may decline—especially among users seeking professional knowledge on the platform.

[1] Quora and Reddit user counts are from https://expandedramblings.com/index.php/reddit-stats/ and https://expandedramblings.com/index.php/ quora-statistics/, respectively. Zhihu user count is from https://www.abacusnews.com/who-what/zhihu-where-people-china-go-ask-questions-and-get-answers/article/2168312

Based on a combination of three empirical studies comprising a secondary data analysis, survey, and lab experiment, our study indicates that the use of linguistic devices plays a nontrivial role in influencing the perceived professionalism and popularity of knowledge content in Q&A communities. Specifically, linguistic tools such as displaying confidence and using examples can enhance content popularity while simultaneously increasing perceived professionalism. In addition, the use of a succinct paragraph structure and humor can enhance content popularity. However, whereas succinct paragraph structure has no association with perceived professionalism, employing humor may negatively affect perceptions about the content's professionalism.

Our paper contributes to research and practice in the following ways: First, although the emergence of professional Q&A communities has greatly facilitated the dissemination of scientific knowledge to the public, one unanswered question is how to popularize knowledge that is more difficult to comprehend and less catchy than information about daily routines, gossip, or fake news (Kim & Oh, 2009; Radford et al., 2017). The prevalence of online content such as gossip and fake news hampers rather than facilitates the dissemination of scientific knowledge to the public. Our study shows that paying attention to writing style by enhancing certain linguistic features can increase user endorsement of content while supporting perceived professionalism. Second, by demonstrating how certain linguistic devices can promote or undermine popularity and perceived professionalism, our findings provide clear guidance to experts and individuals with deep domain knowledge on how to present professional scientific writing for wider dissemination. Third, by revealing the inconsistency between content popularity and perceived professionalism and by suggesting solutions to close the gap in order to achieve the community's value realization and sustainability, our study suggests that Q&A community managers concern both types of content and provide guidance to contributors regarding writing techniques. As a whole, our study contributes to better scientific knowledge dissemination online via Q&A communities with a view toward increasing popularity through the responsible use of linguistic devices in scientific writing.

1.1 Research Context and Data

We conducted our investigations in the context of Zhihu (www.zhihu.com)[2], a leading professional Q&A community in China. Founded in 2013, Zhihu provides a platform for users from different backgrounds to share knowledge, personal views, and experiences. The number of daily active users of Zhihu exceeded 18.5 million at the end of 2016.[3] Registered users can post questions in a relevant knowledge domain or subdivision of Zhihu, and any registered user can answer the question, make a comment, or endorse an answer by clicking "upvote."

We collected data from the homepages of the mathematics and biology domains/subdivisions at the Zhihu website. We selected these two knowledge domains because they are relevant to everyday life and because nonexperts will generally encounter difficulty in attempting to understand these domains. In addition, compared with liberal arts subjects (that allows for greater subjective interpretation), the relatively clear and stringent truth criteria associated with these domains make it easier to objectively assess their professional validity, which is one of the focal dependent variables in this study.

For the mathematics and biology domains, we first selected the recommended questions that appeared on the first page of these subsections (12 and 11 questions, respectively).[4,5] We selected these questions as the starting point to collect data; based on the answers to these questions, we assessed our focal dependent variables—namely, popularity and evaluation of professionalism. Since these questions are recommended questions, we could assume that the answers they generated would be relatively complete and stable (i.e., following our data collection, the pool of answers to the questions would be unlikely to change), which minimized the concern that our data and analyses could be biased or incomplete.

We subsequently focused on the top 50 answers to each of the questions and collected the content of each answer, number of upvotes, and number of comments.[6] We limited the number of answers included for each question to the top 50, because answers beyond the top 50 attracted few or zero upvotes, which made it meaningless to assess variables such as popularity (the

[2] While Zhihu is similar in format to the US site Quora (www.quora.com), Zhihu has greater focus on the dissemination of professional scientific writing than Quora.

[3] Data from http://www.techweb.com.cn/data/2017-01-13/2473034.shtml

[4] While Zhihu does not disclose exactly how they selected these recommended questions, it appears that a combination of factors is considered in the selection, which may include number of upvotes and internal expert assessments about the question quality, as well as the completeness of the answers obtained in adequately addressing the question concerned.

[5] Examples of the questions are such as "In mathematics, why is *e* called the nature base? What is the relationship between *e* and the nature?" "How can you prove that 0.99999…. equals 1?" "Can someone whose face turns red immediately when drinking alcohol improve his or her tolerance of alcohol?" "Is the Chinese-style confinement after childbirth scientifically valid?"

[6] However, because the number of comments for answers is highly correlated to the number of upvotes, we did not incorporate it into our empirical model.

upvote distribution of answers is shown in Figure A3 in the Appendix). This observation is consistent with studies that demonstrate that user attention in Q&A communities concentrate on a relatively small percentage of top-ranked postings (Rughiniş et al., 2014).

We also collected information about users who answered questions, including total number of upvotes, thanks received from other users, number of followings and followers, and areas of expertise (see example webpages of Zhihu.com in Figure A1 and Figure A2 in Appendix A). The 23 questions that we selected were posted online from May 2011 to January 2015 and the 1,150 answers (600 in mathematics and 550 in biology) to these questions were published between May 2011 and June 2015. We collected the data for the dependent variables (in particular, popularity) one year after June 2015 to ensure that the popularity (total number of upvotes garnered) for each answer had stabilized. Together, these data formed the secondary data set used for our investigation.

The remainder of this paper is organized as follows: Section 2 presents a precursor study exploring whether expert and nonexpert users evaluate professionalism of knowledge content in Q&A communities similarly, and whether inconsistency exists between content popularity and perceived professionalism. The insights obtained set the context and focus of our subsequent study. Section 3 discusses the conceptual foundation of our study, which serves as the basis for our research hypotheses. Sections 4 and 5 describe and present the results of the series of empirical tests we used to test our hypotheses, including a secondary data analysis, survey, and lab experiment. Finally, in Section 6 we discuss the implications of our findings for research and practice and then conclude the paper.

2 Preinvestigation of Knowledge Content Popularity and Perceived Professionalism in Q&A Communities

We first conducted a preinvestigation to understand how ordinary, nonexpert users—as compared to experts—evaluate the professionalism of knowledge content in a Q&A community and investigate whether knowledge content perceived as having high professionalism is popular in the community.

Understanding how users perceive the professionalism of knowledge content in a Q&A community is imperative. Providing professional knowledge constitutes a core objective of communities like Zhihu.com (Shen et al., 2009; Li, He, Jeng, Goodwin, & Zhang, 2015), and since the main users of this site are ordinary users, these users must perceive the knowledge content provided in these communities to be of professional quality rather than simply valuable for entertainment purposes in order for the core objective of the community to be met. Formally, *professionalism* refers to the evaluation of content as being of professional- quality specialized science information (Zhu, Bernhard, & Gurevych, 2009). Professionalism is typically used as an indicator of knowledge content quality in Q&A communities (Shen et al., 2009; Zhu et al., 2009; Fichman, 2011) and may include the dimensions of accuracy, relevance, and clarity (Wang & Strong, 1996; Kim et al., 2007). These three dimensions are the most acknowledged content quality evaluation criteria by users in Q&A communities (Kim et al., 2007) and are associated with demonstrated expertise in answer provision (Zhu et al., 2009). *Popularity*, by contrast, is a relatively straightforward measure and is typically represented by user endorsement in terms of the number of votes given to answers in Q&A communities (Jin et al., 2017).

We recruited 495 students from a large public university to assess a collection of answers from the secondary data set extracted from the Q&A community under study. For the answers, we selected two questions in mathematics and two questions in biology and displayed the top 20 answers for each question to the participants.[7] We chose the four questions based on the median level of Kendall's tau for their answers to make the results of our analyses more representative.

Among the participants, 240 were deemed domain experts given their majors in biology or mathematics (i.e., the same domains of the answers to be assessed)[8] and their postgraduate level (i.e., primarily PhD students). The other 255 participants were students from majors outside of biology and mathematics. The background information of the participants is reported in Table C2 in Appendix C. Given that users of Q&A communities such as Zhihu comprise mainly young people with high educational levels, we consider the participant sample to be appropriate.[9] All participants were required to report to a computer lab. We randomly assigned each participant to one of the four selected questions and the corresponding 20 answers, with experts assigned questions appropriate to their major or knowledge domain. Participants were instructed to browse the materials for 15 minutes; afterward, they were asked to assess the

[7] We did not show all top 50 answers to the participants to avoid overloading them and compromising the accuracy of their assessments of the answers.

[8] Several postgraduate students majoring in economics were recruited as experts because one of our chosen questions concerns game theory.

[9] Source: https://www.zhihu.com/question/20321074/

professionalism of the answers.[10] Participants were compensated with a small monetary amount as a token of appreciation.

We asked the expert participants to judge the professionalism of the answers on a 3×10-point scale along three dimensions: accuracy, relevance, and clarity (examples and details of the professionalism assessment are listed in Table B1 in Appendix B). For nonexpert participants, we asked whether they believed the answers demonstrated sufficient expertise (and thus were reliable and trustworthy)—i.e., *perceived* professionalism. We adopted different measurement approaches for the expert and nonexpert participants based on the following reasons: For experts, our aim was to leverage their expertise in order to obtain an accurate assessment of the professional quality of knowledge content in an objective and comprehensive manner. For nonexperts, the perceptual assessment was likely to reflect the typical way they evaluated whether an answer was professional under normal circumstances (i.e., forming an overall perception rather than deliberately assessing the different dimensions of professionalism). As such, asking them to evaluate professionalism based on the same three dimensions as the experts could possibly result in biased assessments in some ways because they are likely unqualified to adopt such an assessment approach. Furthermore, this approach provided a more conservative estimate of the consistency between expert and nonexpert assessments.

Because every answer was judged by multiple (three) experts, we first examined the consistency of their assessments. For expert assessments, we computed a professionalism score for each answer by taking a 2:1:1 weighted average of the three dimensions, given that *accuracy* is usually more important for judgments of professionalism than *relevance* or *clarity* (Fichman, 2011; Wang & Strong, 1996). Based on Cronbach's alpha values, Table C3 in Appendix C reveals that experts consistently evaluated the professionalism of the studied knowledge content.

Subsequently, we compared the expert assessments and nonexpert assessments. After taking an average of perceived professionalism by multiple nonexperts for each answer, we examined whether the expert assessments and nonexpert assessments were consistent. We found that the correlation coefficient of professionalism as judged by the experts and the perceived professionalism of the nonexperts was as high as 0.785, suggesting that *overall, nonexperts are capable of evaluating the professionalism of knowledge content.*

In addition, as a proxy to measure the likelihood of popularity, we included a measure of perceived popularity whereby we asked participants whether they would personally vote for the answer. We determined that the correlation coefficient of the upvote intention of the experts and that of the nonexperts was only 0.458, suggesting a salient discrepancy between expert and nonexpert perceptions of the popularity of knowledge content. Moreover, the correlation coefficient of perceived professionalism and upvote intention of the nonexperts was only 0.395, whereas the correlation was much higher for experts. This suggests that, as a whole, *nonexperts do not perceive professional knowledge content to be appealing.*[11]

As can be seen from the preinvestigation results, although nonexperts, or ordinary users, assess the professionalism of knowledge content in Q&A communities similarly to experts, they do not necessarily *like* content that they perceive as highly professional. Therefore, rather than deliberating on how to enhance ordinary users' ability to discern professional knowledge content from nonprofessional content, a more fruitful direction would be to investigate what can be done to address the discrepancy between the content that users perceive as professional from the content they are more likely to vote for (resulting in a higher ranking and greater popularity in the Q&A community). In the following, we propose the use of appropriate linguistic devices as a viable solution to this discrepancy and present the corresponding conceptual bases and hypotheses.

3 Conceptual Foundation and Hypothesis Development

3.1 Q&A Communities

Research on Q&A communities (see Table E1 in Appendix E for a review) has primarily focused on the factors that contribute to popularity or outcomes reflected by popularity ranking (mainly in terms of votes received) (e.g., Jin et al., 2017; Rughiniş et al., 2014; Stoddard, 2015; Fu, Wu, & Oh, 2015; Li et al., 2015). Among these studies, several textual features have been empirically tested to varying degrees, including length features indicating how long the text is (e.g., Agichtein, Castillo, Donato, Gionis, & Mishne, 2008; Harper, Raban, Rafaeli, & Konstan, 2008), structure features indicating how effectively the content of a text is organized (e.g., Gazan, 2006), style features capturing the author's writing style (e.g., Hoang, Lee, Song, & Rim, 2008), and readability features indicating text-based comprehensibility (e.g.,

[10] We ensured that three experts and at least three nonexperts or laypersons assessed each answer.

[11] To gain greater confidence that this discrepancy indeed exists, we compared knowledge content professionalism and popularity based on objective data (i.e., Are answers with numerous upvotes in the community also those that are judged as highly professional?). Details are available in Appendix D.

Fu et al., 2015). For example, on Quora.com, Rughiniş et al. (2014) ascertained that the number of votes for an answer depends to some extent on word count, number of followers, and use of visual representations. Fu et al. (2015) extracted and examined the textual features of answers on StackExchange, including number of words, paragraphs, images, verbs, and pronouns, as well as nontextual features.

Besides popularity ranking, answer quality that is operationalized based on user-oriented relevance has attracted some academic attention (Chua & Banerjee, 2013). Studying Yahoo! Answers, Kim et al. (2007) determined that the user-oriented relevance attributes of best answers comprise content value, cognitive value, and socioemotional value. Similarly, Zhu et al. (2009) developed a multidimensional model for evaluating answer quality from user perspectives that include informativeness, completeness, readability, conciseness, truthfulness, detail level, originality, objectivity, novelty, usefulness, and expertise. Although user-oriented relevance is a subjective and situational concept with multiple shades and overlapping facets (Shachaf, 2009), many studies have embraced it to evaluate answer quality and likewise have investigated how to predict answer quality by using tools similar to the aforementioned textual or nontextual features (e.g., Dalip, Gonçalves, Cristo, & Calado, 2011; Shah & Pomerantz, 2010; Arai & Nur, 2013). For example, in the context of Yahoo! Answers, Shah and Pomerantz (2010) extracted various textual features, including length of the answer's content, inclusion of references from the answer, and nontextual features to predict user-judged answer quality.

Although the importance of popularity ranking and content quality for answers in Q&A communities has been widely acknowledged and studied, to the best of our knowledge, no study has yet addressed how to achieve both of these aims. In addition, the selection of textual features in prior studies varies substantially and relies heavily on the researchers' own judgment, which points to the need of a theoretical understanding of the effects of textual features on popularity and quality. Therefore, in this study, we focus on both the popularity and professional quality of answers and, based on the science popularization literature discussed in Section 3.2, hypothesize that linguistic features may contribute to popularity rankings while ensuring the perceived professionalism of knowledge content.

3.2 Science Popularization

Science communication has its historical roots in the popularization of science in the 19th century, when science began to become sufficiently specialized to require translation to be understood by an interested public (Weingart & Guenther, 2016). The popularization of science—that is, the wide dissemination of scientific information to a nonspecialized public (Jensen, 2008)—involves a vast class of multifarious communicative events or genres that involve the transformation of specialized knowledge into everyday knowledge (Calsamiglia & Dijk, 2004). Conventional forms of this type of discourse have been restricted to magazines, newspapers, public lectures, radio, and television (Bentley & Kyvik, 2011). As digital technologies rapidly evolve, new avenues of popularization employing the Internet, such as YouTube, Wikipedia, and Q&A communities, have emerged and drastically broadened the reach of popular science (Zhang, 2012; Weigold, 2001; Davies & Hara, 2017).

Because the Internet has become a major interactive source for scientific knowledge (National Science Board, 2018), several studies have investigated science communication and dissemination in digital media (e.g., Jia & Zhu, 2017; Anderson & Huntington, 2017). Notably, methods of presenting and packaging scientific knowledge can help determine how well such content is received by the masses and thus broaden its dissemination. For instance, in the video-sharing context, Welbourne and Grant (2016) examined the elements that influence the popularity of science videos on YouTube. Carlo (2014) investigated how the use of examples and references increases the credibility of popular scientific content in TED talks. In the blog context, Winter and Krämer (2012) examined how cues describing the authors and indications about whether science articles are one or two sided influence nonexperts' decisions on which scientific content to read on a blog. Luzón (2013) analyzed the strategies used by bloggers to communicate and recontextualize scientific discourse; the study results showed that, given the diverse audience for science-related posts, bloggers often blend discursive practices such as adjusting information to suit the readers' knowledge level and employing linguistic features to achieve their rhetorical purposes.

Similarly, Q&A communities such as Zhihu that seek to disseminate professional-quality scientific knowledge represent a novel, interactive platform for the popularization of science. Framing scientific knowledge in interpretative packages, especially in the Web 2.0 environment, can help to communicate science to the public more effectively (Bubela, Nisbet, Borchelt, Brunger, Critchley, Einsiedel, & Jandciu, 2009; Nisbet & Scheufele, 2009; Brossard & Scheufele, 2013). In this study, we focus on the popularization of scientific knowledge in Q&A communities focused on the dissemination of professional scientific writing and highlight framing methods through linguistic devices that can enhance the popular appeal of knowledge. In particular,

following previous studies on science popularization, we investigate linguistic devices that can influence two crucial features of communicated content: popularity and professionalism.

3.3 Effects of Using Linguistic Devices on Popularity and Professionalism

Much of the literature on science popularization and communication has been devoted to the linguistic features of popular texts, which have been examined in relation to scientific journal papers (Myers, 1991; Nwogu, 1991; Leydesdorff & Hellsten, 2005; Kueffer & Larson, 2014). Even given the same research output, journal papers written for expert audiences and popular texts written for nonexpert readers often differ substantially in linguistic form (Nwogu, 1991).

The reasons for such differences lie in the knowledge possessed by readers of the two types of texts. In general, readers of scientific texts are considered experts with extensive domain knowledge, whereas readers of popular texts are mainly nonexperts who may be keen to learn about the corresponding areas of expertise (Myers, 1991). Given their deep domain knowledge, experts easily grasp the implicit cohesion within abstruse scientific texts. However, as readers of popular texts have little or no prior knowledge, they require the aid of explicit signals and other in-text semantic and structural means to infer lexical relationships, or links from the semantic field of the specialized domain to the semantic field of everyday life (Myers, 1991). Accordingly, authors of popular science content often employ various linguistic devices to enhance the comprehensibility of their communicated content to attract nonexpert readers and garner more favorable reception of their writing (Vogel, 2010).

The repertoire of linguistic devices used by experts in science popularization is extremely diverse and includes explanation of specialist terms, reformulation, and a variety of ways of structuring complex statements (Gülich, 2003). Scholars have adopted different perspectives on discourse representation, including the grammar perspective (Oliveira and Pagano, 2006), the lexical perspective (Myers, 2001), the syntactic perspective (Kahn, 1983), and the structural perspective (Nwogu, 1991). Because vocabulary and syntax vary greatly across scientific domains and language environments (Hoff, 2006; Myers, 1991; Fu et al., 2015), this study focuses on the use of common linguistic devices that may be generally applied across domains in a general scientific communication environment, such as Q&A communities like Zhihu that are focused on disseminating professional-quality scientific knowledge.

We first reviewed the common linguistic devices investigated in related literature streams, including research on science popularization, academic writing, and Q&A communities (see Table E2 in Appendix E). Specifically, given that there is no clearly established framework available to identify the linguistic devices examined in this study, we combed through the pertinent linguistic devices investigated in the literature to assess their relevance to this study. In general, the linguistic devices investigated in the literature can be broadly categorized into those related to content structure and those related to the semantic aspects of the content. The former involves linguistic devices that focus on the presentation of text, whereas the latter are those that deal with the meaning and interpretations of the content itself (Campbell, 1991; Gattis, 2006; Halliday & Hasan, 1976). Examples of structural linguistic devices include succinct paragraph structure and the use of citations. Examples of semantic linguistic devices include the use of metaphors and examples, which can help clarify the meaning of content by linking the scientific content to what the reader's background knowledge. Where possible and appropriate, we employ the major linguistic devices investigated in the literature (see Table A-8 in Appendix A5), resulting in the inclusion of the following devices that we hypothesize will affect popularity and perceived professionalism: *succinct paragraphs*, *typographical cues*, *metaphor*, *humor*, *confidence*, *example*, and *citation*.

3.3.1 Succinct Paragraph Structure

Authors can organize their ideas in various ways to create different text structures (Otero et al., 2002). Clearly, an ineffectively organized piece of writing can lead to difficulties in understanding (Parsons, 1990) or a blurring of meanings (James, 1984). Studies on learning and recall of various textual genres provide evidence that effectively organized texts activate schema-based expectations that can be used effectively in comprehending, constructing, and recalling textual information (Kintsch & Yarbrough, 1982; Vauras, Hyönä, & Niemi, 1992).

An effectively organized piece of writing increases text-based comprehensibility that is capable of attracting nonexpert readers mainly through linguistic simplification. A practical way of achieving this is by employing succinct paragraph structure. Compared with articles not organized into paragraphs, articles with succinct paragraphs structure meaning, improve readability (Yano, Long, & Ross, 1994), and may thus enhance content popularity. This is especially pertinent in light of the information overload problem in an online context. Previous studies have indicated that the number of paragraphs is a key indicator of whether content in Q&A communities is organized effectively (e.g., Dalip et al., 2011; Fu et al., 2015). Given the potential of succinct paragraph structure to improve

text-based comprehensibility, we hypothesize the following for scientific knowledge communication in Q&A communities:

H1: The use of succinct paragraph structure is associated with higher popularity of scientific knowledge communication in Q&A communities.

We did not, however, expect succinct paragraph structure to substantially influence professionalism because it relates more to the physical appearance of the text and less to the content that is the subject of credibility assessments and, thus, evaluations of professionalism (Dalip et al., 2011).

3.3.2 Typographical Cues

Typography represents a simple linguistic device that can guide a reader's text processing. Boldface, underlining, and italics are typical typographical cues or signals that can be used to introduce technical terms, emphasize vital information, and call attention to key concepts (Lorch, & Klusewitz, 1995).

Several studies have demonstrated that applying typographical cues such as boldface to target sentences increases text-memory (Lorch, 1989). Other studies have reported that typographical cues result in shorter response times and higher assessments of the comprehensibility of the information, especially for technical texts (Frase & Schwartz, 1979). By manipulating the amount of boldface among materials, Ozuru, Dempsey, and Mcnamara (2009) demonstrated that text with more boldface could improve reading comprehension. Experiments on reading capacity have revealed similar results. For instance, Britton, Glynn, Meyer, and Penland (1982) demonstrated that texts highlighting idea importance and idea relations require less cognitive capacity to process than texts with approximately the same propositional content but no such signals.

In science popularization, typographical cues are widely used as explicit signals to highlight lexical relationships (i.e., relationships between words), enhance comprehensibility, and thereby attract more nonexpert readers. Again, this could be especially salient in an online context where plentiful information competes for user attention (Agichtein et al., 2008; Chai, Wu, Potdar, & Hayati, 2011). Thus, we hypothesize that:

H2: Greater usage of typographical cues is associated with higher popularity of scientific knowledge communication in Q&A communities.

Similar to succinct paragraph structure, typographical cues relate primarily to the physical appearance of text and are intended to provide focus and improve comprehensibility. We did not expect typographical cues to substantially influence perceived professionalism, which has less to do with text appearance and more to do with content (Dalip et al., 2011).

3.3.3 Metaphor

Popularization discourse needs to be formulated in such a way that nonexpert readers are able to construct lay versions of specialized knowledge and integrate these with their existing knowledge bases (Calsamiglia & Dijk, 2004). One linguistic means of linking two domains of meaning or knowledge is metaphorical language, which includes metaphors, comparisons, and analogies (Camus, 2009; Leydesdorff & Hellsten, 2005; Kueffer & Larson, 2014) and has played a crucial role in the popularization discourse. This is particularly true for abstruse scientific content, where scholars have long defined and explained terminologies in terms of metaphors. For example, in genetics, the genome is often conceptualized in terms of a code or a book (Calsamiglia & Dijk, 2004).

Metaphorical language may directly link with the public's general knowledge, increasing comprehensibility (Gotti, 2014) and thereby enabling communication of scientific content to more nonexpert readers. Additionally, connecting with audiences may instill a feeling of recognition (e.g., what the author writes is close to what the reader already thinks or believes), which may make readers believe that what the author writes is reliable and can be trusted (Carlo, 2015). Thus, the use of metaphor in scientific content should help promote popularity and professionalism as perceived by nonexperts in Q&A communities. Indeed, metaphor was determined to be a key factor in content sharing in Q&A communities (Harper et al., 2008). Therefore, we hypothesize that:

H3a: The use of metaphor is associated with higher popularity of scientific knowledge communication in Q&A communities.

H3b: The use of metaphor is associated with higher evaluations of professionalism concerning scientific knowledge communication in Q&A communities**.**

3.3.4 Humor

In science popularization, humor is commonly used to connect with the audience (Gotti, 2014). Humor is a convenient label for a wide array of rhetorical devices ranging from light irony to biting sarcasm (Swales, 2004). The use of humor in academic speech and writing helps to release tension through laughter (Nesi, 2006). Moreover, humor has been found to play an influential role in recall ability and reading comprehension (White, 2001; Schmitz, 2002; Schmidt & Williams, 2001; Worthen & Deschamps, 2008). By randomly assigning students to read texts that do and do not contain a joke (as a humorous element), Hayati,

Shooshtari, and Shakeri (2011) found that students who read texts containing jokes exhibited significant greater comprehension of the texts than those who read texts without jokes. The rationale is that humor renders reading more pleasurable and can spark a reader's interest (Shaughnessy & Stanely, 1991), thus motivating them to more thoroughly attempt to comprehend the text (Naceur & Schiefele, 2005). A recent study on discourse provided more evidence: by recording participants' eye movements while reading short texts, Ferstl, Israel, & Putzar, (2016) ascertained that texts with jokes were read faster and elicited fewer regressive eye movements than did texts without humorous elements. Also, in an online context, content with humorous elements is more likely to be shared if it meets users' socioemotional needs (Kim & Oh, 2009; Kim, 2010). Therefore, we hypothesize that

H4a: Greater expressions of humor are associated with higher popularity of scientific knowledge communication in Q&A communities.

However, we caution that humor may negatively influence public perception of the professional quality of scientific content communicated in Q&A communities. Although humor may foster a bond between the author and the readers that encourages the reader to perceive the author as similar to them and thus more trustworthy (Carlo, 2015), the use of humor may also stoke doubts that the author is not serious or credible, especially in professional content communication (Giannoni, 2008; Riesch, 2015). Therefore, we hypothesize that

H4b: Greater expressions of humor are associated with lower evaluations of professionalism concerning scientific communication in Q&A communities.

3.3.5 Confidence

The credibility of academic writing depends not only on demonstration of absolute truth, empirical evidence or flawless logic, but also on the actions of employing social and linguistic conventions that readers perceive as convincing (Hyland, 1999), especially for nonexpert readers.

In the discourse field, recent research suggests that writers of popular science gain credibility by displaying confidence in their evaluations and commitment to their ideas, in that confidence projects an identity invested with individual authority. The creation of such a socially defined rhetorical identity is accomplished using a range of rhetorical and linguistic features, including personal pronouns, hedges, and boosters (Bazerman, 1988; Hyland, 1998, 2000, 2002; Swales, 1990). For example, the presence of hedging in scientific news reports was demonstrated to influence reader perceptions of the credibility of the author of the report and the scientists mentioned in the article (Jensen, 2008). Similarly, words such as "clearly," "obviously," and "of course" help writers express conviction and assert a proposition with confidence, which increases apparent credibility (Hyland, 1998). In an online context, confidence is a main consideration in users' judgment of professional content in Q&A communities (Oh, Yi, & Worrall, 2012). We therefore hypothesize the following:

H5a: Greater expression of confidence is associated with higher popularity of scientific knowledge communication in Q&A communities.

H3b: Greater expression of confidence is associated with higher evaluations of professionalism concerning scientific knowledge communication in Q&A communities.

3.3.6 Examples

Providing examples is considered to be a typical tool in popularization discourse (Gotti, 2014). As a critical element of science popularization, examples can help nonexperts appreciate complex scientific information. In TED talks, for example, another form of science popularization, speakers often provide vivid examples as they seek to engage the audience (Carlo, 2015). Examples help readers connect scientific knowledge to what they already know and appreciate the utility of the knowledge. In addition, studies have reported that nonexperts often judge the credibility and thus professionalism of scientific writing based on simple cues such as the presence of examples (Carlo, 2015; Hyland, 2010; Horibe, 2015). By relating scientific knowledge to what the reader already knows, the sense of familiarity may increase their assessment of the credibility and thus improve evaluations of the communication's professionalism (Begg, Anas, & Farinacci, 1992; Hasher, Goldstein, & Toppino, 1977). Accordingly, we hypothesize that

H5a: Greater usage of examples is associated with higher popularity of scientific knowledge communication in Q&A communities.

H5b: Greater usage of examples is associated with higher evaluations of professionalism concerning scientific knowledge communication in Q&A communities.

3.3.7 Citation

Research has shown that a message's persuasiveness is influenced by the message recipient's beliefs about the source (Sprecker, 2002). Messages attributed to credible sources have been proven to be more persuasive than messages attributed to sources of questionable credibility (Hass, 1981; Luchok & McCroskey, 1978).

In science popularization, authors cite relevant work and evidence from external sources as a basis for their claims of enhancing source credibility (Ericson,

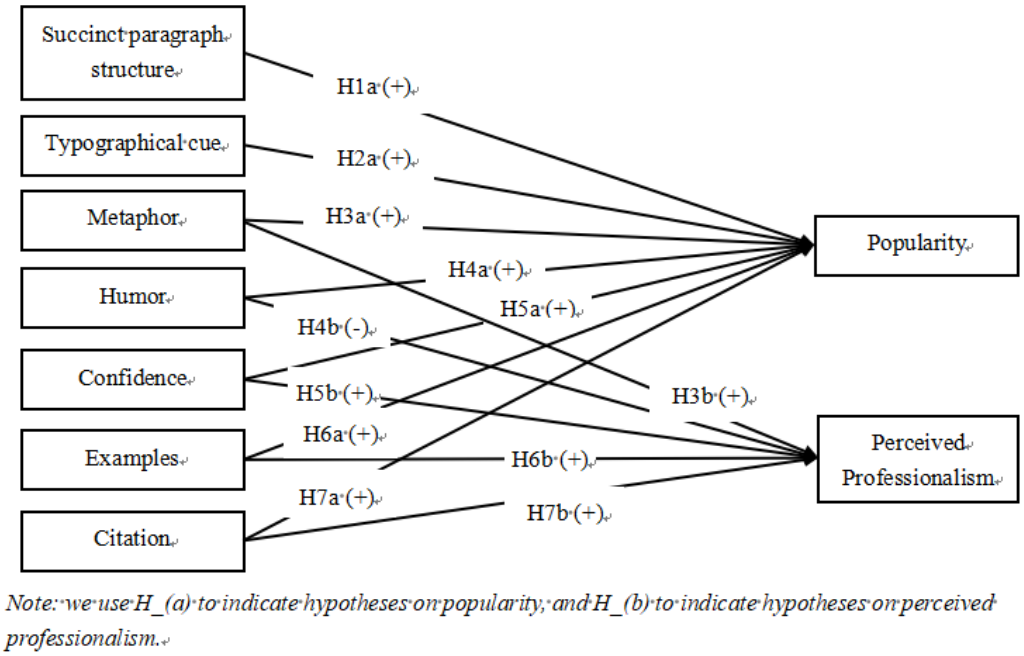
Baranek, & Chan, 1989; Wilkie, 1996). Particularly, in the Web 2.0 context, the presence of references and external resources are influential features of high-quality content (Gazan, 2006). Absent the requisite domain expertise to assess scientific knowledge, the presence of citations in writing may serve as a powerful cue to nonexperts that the communicator has ensured the accuracy of the information communicated for the benefit of the readers. This could raise perceptions that the content has high professional quality (Thomm & Bromme, 2012). Especially in the context of Q&A communities where the cost of providing information is low, using citations (rather than just making baseless claims) should improve the reception of one's communication among readers (Shah & Pomerantz, 2010). We therefore hypothesize that:

H5a: Greater usage of citations is associated with higher popularity of scientific knowledge communication in Q&A communities.

H3b: Greater usage of citations is associated with higher evaluations of professionalism concerning scientific knowledge communication in Q&A communities

Figure 1 depicts the research model of this study.

We tested our hypotheses by using both secondary data at the aggregate level and survey data at the individual level collected in the context of the Q&A community under study, Zhihu.com.



Note: we use H_(a) to indicate hypotheses on popularity, and H_(b) to indicate hypotheses on perceived professionalism.

Figure 1. Research Model

4 Hypotheses Testing

4.1 Hypotheses Testing Using Secondary Data

4.1.1 Variables and Descriptive Statistics

Based on secondary data from Zhihu.com as described in Section 1.1, we coded most variables manually. We invited three undergraduate students studying different majors to view every question and its 50 answers and subsequently asked them to score each variable. Specifically, *succinct paragraph structure* was coded as a dummy variable, where 1 was recorded if the answer text was written with a succinct paragraph structure, and 0 was recorded otherwise.[12] Regarding typographical cues, the most common cue used for text editing in answers is boldface (typographical cues such as italics and underlining are relatively rare). Thus, in this study, we coded *typographical cue* as the number of boldfaces used. *Metaphor* is a dummy variable representing whether metaphorical language was used in the answer, and *example* is a continuous variable used to represent the number of examples or cases used in the answer.[13] Similarly, *citation* is the number of citations used in the text. *Humor* and *confidence* reflect readers' personal feelings toward the answers. Thus, for humor, we asked students to score each answer from 1 to 5, with larger values indicating a stronger sense of humor. Confidence was scored continuously from 0 to 1 by the professional sentiment research firm bosonnlp.com,[14] with larger values implying more affective attitudes associated with confidence level.[15]

The coding of dependent variables is described in Section 2. We calculated professionalism alternatively by taking an average value with the same weighting for the three dimensions (i.e., 1:1:1 for accuracy, relevance, and clarity) as a robustness check of our results, which are reported in Appendix A8.

Furthermore, we controlled several major factors that could influence the assessment of professionalism for each answer. Specifically, we controlled the length of answers (word count). According to Fu et al. (2015), length may be an indicator of professional quality. We controlled the presence of images in answers (number of images), the use of which has become common in online science popularizations. Although image may influence audience perception, the effect is debatable (Myers, 1990; Gruber & Dickerson, 2012; Macedorouet, Rouet, Epstein, & Fayard, 2003). In addition, consistent with prior studies (e.g., Jin et al., 2017), we controlled factors related to answer providers such as the number of followings and followers and the number of questions they had answered prior to answering the selected question in this study (answered questions),[16] and whether the topic of the focal answer belonged to the answer provider's stated area of expertise (topic matched).[17] In Q&A communities, users' preferences and judgments of professionalism may be partly influenced by their personal impressions of answer providers (Hyland, 2001).

Notably, the undergraduate students provided consistent coding on typographical cues and citations because these linguistic features are obvious. However, judgments of *succinct paragraph structure, metaphor, humor,* and *example* are mainly based on the students' subjective evaluations, as were their assessments of professionalism. Thus, we checked the consistency of the coding of these variables among the three coders by using Cronbach's alpha values. The results of Table F1 in Appendix F suggest that the coding of the three coders for each variable were consistent. Table 1 summarizes the descriptive statistics of the variables, which indicate that the average professional quality of the selected answers in Zhihu is moderate (mean value of professionalism is approximately 5) and the contents are less humorous in terms of linguistic style (mean values of humor are low).

[12] Answer texts in Zhihu.com are edited by the answer providers themselves, and the text-editing page is similar to Microsoft Word, so the structure and layout of content differ among answers.

[13] Some variables were measured using a dummy of one or zero, whereas some were measured with continuous values based on actual situations. For instance, metaphors are rarely used more than once if at all in short answers but are more common in answers containing more than one example.

[14] The firm used a semisupervised machine-learning sentiment analysis model based on a linguistic data set from Chinese social media postings and news reports containing more than 1 million data points. The accuracy of attitude judgment is higher than 85% (source: http://bosonnlp.com/product).

[15] The confidence scores with the measurement are highly correlated with the scores manually coded by the users in the survey (correlation at 0.813), which provides evidence that supports the validity of the measurement.

[16] We collected these factors many days after they had provided the focal answer. Therefore, in regression, we adopted the following formula to refer to the number of answered questions when the user wrote the answer: $(T_i - T_r)/(T_c - T_r)\cdot N$, where N is the observed number of answered questions up to the day of data collection; T_i is the month of writing the focal answer; T_c is the month of data collection of this study; and T_r is the month of user registration. We adopted a similar approach to adjust the number of followings and followers.

[17] In Zhihu, each user may state one or multiple areas of expertise that appear on the personal homepage as shown in Appendix A1, Figure A-2.

Table 1. Summary Statistics of Variables

Variable	Math (*N* = 600)		Biology (*N* = 550)		Overall (*N* = 1,150)			
	Mean	S. D.	Mean	S. D.	Mean	S. D.	Min	Max
Professionalism	5.57	2.21	4.74	1.62	5.14	1.96	0	9.83
Popularity (Upvotes)*	1.84	1.96	2.24	2.08	2.05	2.03	0	10.28
Succinct paragraph structure	0.23	0.42	0.14	0.35	0.19	0.39	0	1
Typographical cue	1.21	5.42	0.39	2.19	0.78	4.09	0	58
Metaphor	0.16	0.37	0.20	0.40	0.18	0.39	0	1
Humor	1.69	0.70	1.95	0.66	1.83	0.69	1	5
Confidence	0.64	0.29	0.50	0.33	0.57	0.32	0.02	1
Example	1.08	0.42	1.65	0.65	1.35	0.53	0	6
Citation	0.08	0.67	0.13	2.08	0.11	1.57	0	48
Length*	4.43	1.65	4.31	1.56	4.37	1.60	0	9.28
Image	0.42	1.91	0.77	4.74	0.60	3.67	0	77
Topic matched	0.06	0.24	0.03	0.17	0.04	0.21	0	1
Answered questions	15.97	51.6	26.59	95.2	20.82	72.1	1	1,768
No. of followers	44.92	171.5	41.25	168.7	41.05	162.3	1	4,658
No. of followings	48.28	107.3	37.56	131.3	40.59	115.2	1	1,370

Note: *These variables were natural log-transformed.

Table 2. Estimation Results (DV: Popularity)

Variables	Mathematics		Biology		Overall	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Intercept	-1.21	0.32***	-2.49	0.30***	-1.97	0.21***
Succinct paragraph structure	0.35	0.17**	0.57	0.19***	0.40	0.13***
Typographical cue	0.04	0.04	0.18	0.24	0.13	0.13
Metaphor	0.29	0.21	0.33	0.20	0.32	0.24
Humor	0.34	0.14***	0.66	0.11***	0.62	0.08***
Confidence	0.19	0.14	0.38	0.20*	0.20	0.11*
Example	0.44	0.14***	0.32	0.15**	0.42	0.11***
Citation	-0.11	0.10	-0.04	0.04	-0.07	0.05
Length	0.18	0.15	0.23	0.23	0.21	0.14
Image	0.09	0.08	0.06	0.04	0.07	0.07
Topic matched	0.15	0.30	-0.17	0.16	-0.36	0.25
Answered questions	-0.03	0.12	-0.03	0.06	-0.03	0.06
No. of followers	0.10	0.05**	0.09	0.05*	0.09	0.05*
No. of followings	0.01	0.08	0.01	0.02	0.01	0.05
Adjusted *R* square	0.299		0.307		0.301	
N	600		550		1,150	

Note: * p < 0.10, ** p < 0.05, *** p < 0.01.

Table 3. Estimation Results (DV: Perceived Professionalism)

Variables	Mathematics		Biology		Overall	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Intercept	2.23	0.37***	1.97	0.22***	2.15	0.21***
Succinct paragraph structure	0.32	0.20	0.20	0.15	0.21	0.13
Typographical cue	0.01	0.02	0.07	0.06	0.03	0.03
Metaphor	-0.25	0.25	0.10	0.15	-0.18	0.14
Humor	-0.24	0.13*	-0.22	0.09**	-0.23	0.10**
Confidence	0.87	0.28***	0.15	0.06***	0.66	0.15***
Example	0.53	0.18***	0.43	0.12***	0.50	0.11***
Citation	0.30	0.12***	0.09	0.05*	0.10	0.04**
Length	0.54	0.06***	0.56	0.04***	0.56	0.04***
Image	0.38	0.15**	0.21	0.12*	0.27	0.13**
Topic matched	0.12	0.36	0.21	0.33	0.18	0.25
Answered questions	-0.03	0.15	-0.12	0.15	-0.06	0.12
No. of followers	0.05	0.03*	0.11	0.05**	0.09	0.05*
No. of followings	0.01	0.08	0.01	0.03	0.01	0.05
Adjusted *R* square	0.373		0.452		0.399	
N	600		550		1,150	

Note: * p < 0.10, ** p < 0.05, *** p < 0.01.

4.1.2 Hypothesis Testing Results at Aggregate Level

The correlation coefficient of professionalism and popularity equals 0.39 (correlation matrix is reported in Table G1 in Appendix G). We thus employ seemingly unrelated regression (SUR) estimation to simultaneously analyze the effects of the focal textual features on popularity and perceived professionalism, with the estimation results reported in Table 2 and Table 3, respectively. The contemporaneous uncorrelation test result ($p < 0.01$) suggests that adopting SUR improves the estimation efficiency compared with ordinary least squares regression (Breusch & Pagan, 1980).

Table 2 indicates that regardless of the mathematics or biology subsample or the entire sample, *succinct paragraph structure*, *humor*, and *example* are significantly associated with higher popularity (H1, H4a, and H6a supported). In addition, expression of confidence is significantly associated with higher popularity in the biology subsample (and the entire sample as well) but not in the mathematics subsample (H5a partially supported). The number of followers is positively related to popularity. These factors together explain approximately 30% of the variance in content popularity.

The results in Table 3 suggest the factors are differently associated with perceived professionalism. Specifically, factors related to the physical appearance of the text content such as succinct paragraph structure and typographical cues (boldface) do not influence the professionalism assessment of content as expected. By contrast, features related to the content, in particular confidence, example, and citation, are significantly associated with higher evaluations of professionalism, regardless of whether the biology subsample, mathematics subsample, or the entire sample was analyzed (H5b, H6b, and H7b supported). Notably, although humor can increase popularity (Table 2), it has a significantly negative association with evaluations of professionalism (H4b supported).

In addition, control variables, particularly length of content, number of images, and number of followers, were found to be positively related to the evaluation of professionalism. These factors together explained approximately 40% of the variance in evaluations of professionalism. The results based on the secondary data analysis are summarized in Table 4.

Table 4. Classification of Linguistic Features Based on Secondary Data Analysis Results

Types of linguistic features	Data analysis results
Linguistic features that enhance popularity while *having no effect on* perceived professionalism	Succinct paragraph structure
Linguistic features that enhance both popularity and perceived professionalism	Confidence, example
Linguistic features that enhance popularity but *lower* perceived professionalism	Humor

As already stated, as a robustness check, we employed an alternative method of computing the professionalism score (i.e., rather than taking a 2:1:1 weighted average of the accuracy, relevance, and clarity dimensions, we took an average of the three dimensions). Table H1 in Appendix H reports the results of the SUR estimation based on this alternative measure of professionalism, which demonstrates consistent findings, thus lending support to the robustness of our results.

Although we included the two different knowledge domains of mathematics and biology in an effort to enhance the generalizability of our findings, we also separated the knowledge domains into specific themes to determine whether the results differed. Specifically, we classified the mathematics and biology questions into two subtopics: theoretical and applied mathematics and natural and human biology, respectively. The estimation results for the different subtopics are reported in Table H2 and Table H3 in Appendix H. The results exhibit consistent patterns in terms of the direction and significance of the investigated relationships across all subtopics, suggesting that our findings are robust.

4.2 Hypotheses Testing Using a Survey

In addition to the analysis using secondary data, we conducted a scenario-based survey to test our proposed hypotheses at the individual level. A survey analysis can complement secondary data analysis in the following respects: First, the content popularity (i.e., number of votes) and the corresponding evaluation of professionalism in the secondary data did not originate from the same groups of users. Second, our secondary data set was snapshot based, which may not precisely identify users' individual decisions. Third, we cannot capture and control for the possible interference of answer rank and peer influence on the secondary data.

4.2.1 Measures Employed in Survey

Similar to the description in Section 2.2, we asked survey respondents to provide their perceived professionalism and upvote intentions, which are the dependent variables in this study.

The measurements of the independent variables (linguistic and textual features) were designed closely following their operationalization in the secondary data analysis. For example, we measured humor, confidence, example, and citation as continuous variables and succinct paragraph structure and metaphor as dummy variables. The details of the survey questionnaire are reported in Table C1 in Appendix C.

Moreover, we controlled for the length and the number of images present in the answer. To control for possible rank influence or peer influence, we asked respondents about the extent to which their inclination to vote could be affected by the rank of each answer or the total upvotes the content had already obtained. Finally, we controlled for respondents' age, sex, major subject, experience using Zhihu, and familiarity with the focal topic.

Because the variables we measured in the survey were quite straightforward (e.g., the presence or absence of linguistic devices or the extent of the presence of linguistic devices), we used single-item measures to minimize the cognitive load on the subjects.[18] Moreover, we conducted two additional analyses to assess whether common method bias could undermine our results. We first performed the test following Malhotra, Kim, & Patil (2006). Specifically, we implemented a marker-variable technique (Lindell & Whitney, 2001) to correct correlations of manifest variables by partialing out correlations using a common method. Subsequently, we conducted a difference test to assess whether partialing out common method variance (CMV) produces any difference between the original correlation matrix and the new correlation matrix. Second, following Lindell and Whitney (2001), we used the second-smallest positive correlation as a more conservative estimate of CMV, which was 0.024 in our data set. After partialing out CMV, the magnitude of change in all correlations was small ($\Delta r < 0.065$) and the statistical significance

[18] Although the literature suggests that multiple-item measurement is more reliable (Boudreau, Gefen, & Straub, 2001; Straub, 1989; Bagozzi, 2011), we conducted additional tests (comparison with multiple-item measurements) and determined that using the single-item measurements in our context are reasonable.

of all correlations remained the same, implying little possibility of common method bias. Thus, these tests indicated that common method bias was not a concern in our study.

4.2.2 Hypothesis Testing Results at the Individual Level

Table 5 reports the summary statistics of the variables. The correlation coefficient of perceived professionalism and voting intention is positive and equals 0.27 (correlation matrix is reported in Table C4 in Appendix C). We accordingly used seemingly unrelated probit regression estimation (SUR) on voting intention and perceived professionalism simultaneously. Table 6 presents the estimation results. The contemporaneous uncorrelation test result ($p < 0.01$) suggests that adopting SUR improves the estimation efficiency compared with separate regression (Breusch & Pagan, 1980).

Table 6 reveals that the results are generally consistent with those tested at the aggregate level with secondary data. The linguistic devices *succinct paragraph structure*, *humor*, *examples*, and *confidence* are significantly associated with higher popularity (H1, H4a, H5a, and H6a supported). However, their associations with perceived professionalism vary. While example and confidence are significantly associated with higher perceived professionalism, the association between succinct paragraph structure and perceived professionalism is nonsignificant. Notably, the use of humor is significantly associated with perceived professionalism in a negative direction, whereas humor's association with popularity is in a positive direction.

Table 5. Summary Statistics of Survey Variables

Variable	Math (N = 122)		Biology (N = 133)		Overall (N = 255)			
	Mean	S. D.	Mean	S. D.	Mean	S. D.	Min	Max
Professionalism	0.34	0.48	0.29	0.46	0.32	0.47	0	1
Upvote	0.64	0.48	0.60	0.49	0.62	0.49	0	1
Succinct paragraph structure	0.68	0.47	0.63	0.48	0.65	0.48	0	1
Typographical cue	2.48	1.52	2.13	1.32	2.30	1.43	1	7
Metaphor	0.30	1.85	0.48	1.59	0.39	1.72	0	1
Humor	4.42	0.46	4.78	0.50	4.61	0.49	1	7
Confidence	0.58	1.29	0.71	1.29	0.65	1.29	1	7
Example	0.58	0.50	0.71	0.45	0.65	0.48	0	1
Citation	2.15	1.67	1.95	1.59	2.04	1.63	1	7
Length	3.62	2.20	3.20	1.80	3.40	2.01	1	7
Image	2.53	2.11	2.06	1.73	2.29	1.93	1	7
Rank influence	0.31	0.47	0.29	0.46	0.30	0.46	0	1
Peer influence	0.39	0.49	0.31	0.46	0.35	0.48	0	1
Gender	0.59	0.49	0.69	0.46	0.64	0.48	0	1
Age	20.89	2.29	21.95	3.66	21.45	3.12	18	36
Education	1.39	0.73	1.66	0.82	1.53	0.79	1	3
Topic familiarity	4.54	1.16	4.11	1.11	3.82	1.05	1	7
Use experience of Zhihu	4.09	1.71	4.67	1.51	4.39	1.63	1	7

Table 6. Estimation Results of Survey Analysis

Variables	Upvote intention (Popularity)		Perceived professionalism	
	Coef.	Std. Err.	Coef.	Std. Err.
Intercept	-4.842***	(1.104)	-3.576***	(1.143)
Succinct paragraph structure	0.356*	(0.206)	0.229	(0.237)
Typographical cue	-0.114	(0.0750)	-0.0822	(0.0774)
Metaphor	-0.281	(0.211)	-0.393*	(0.234)
Humor	0.180**	(0.0705)	-0.216***	(0.0767)
Confidence	0.251***	(0.0689)	0.179**	(0.0720)
Example	0.134*	(0.0726)	0.160**	(0.0814)
Citation	0.0667	(0.0729)	0.163**	(0.0746)
Length	0.0635	(0.0531)	0.220***	(0.0601)
Image	0.0650	(0.0624)	0.106*	(0.0609)
Rank influence	0.252	(0.218)	-0.187	(0.234)
Peer influence	-0.00336	(0.221)	0.466**	(0.223)
Topic familiarity	0.151*	(0.0773)	0.124	(0.0854)
Use experience of *Zhihu*	0.0635	(0.0598)	0.0108	(0.0606)
Log pseudo likelihood	-227.98		-227.98	
Pseudo R^2	0.147		0.248	
N	255		255	

Note: * p < 0.10, ** p < 0.05, *** p < 0.01.

5 Establishing Causal Relationships through an Experiment

In previous sections, we tested our hypotheses through secondary data analysis as well as a survey. However, the two methods (i.e., secondary data analysis and survey) do not lend themselves to establishing the causal relationships between the focal linguistic features and in turn popularity/professionalism. Thus, we further conducted a laboratory experiment to enhance the causal inferences and the robustness of the results.

5.1 Experiment Design and Data Collection

From the secondary data analysis and survey, we found that the linguistic features *succinct paragraph structure*, *humor*, *confidence*, and *example* consistently exhibited a substantial influence on popularity as we hypothesized. Moreover, they vary in their influence on perceived professionalism. Thus, we chose these variables to manipulate in the experiment.

When establishing the experiment, we randomly selected a mathematics question and answer to serve as a baseline group (Treatment 0). We subsequently manipulated the baseline group for one focal linguistic feature at a time while keeping others constant. Specifically, regarding succinct paragraph structure, because the base answer contains clear succinct paragraph structure, we manipulated the baseline group by merging multiple paragraphs into a single paragraph (i.e., Treatment 1: no succinct paragraph). With respect to humor, because the base version does not contain clear humor elements, we adapted sentences from answers rated as highly humorous to make the base version more humorous (i.e., Treatment 2: more humorous). Regarding confidence, because of the lack of confidence expressed in the base answer, we referenced answers rated as highly confident to rewrite certain words and sentences to lend the answer a more confident tone (i.e., Treatment 3: more confident). Finally, with respect to example, we deleted all examples in the base answer to create a new version (i.e., Treatment 4: no examples).

Table 7. ANOVA Results of Experiment

Section A: Manipulation check								
Factor	Baseline (Treatment 0) $N = 57$		Comparative treatment[1]				Comparison	
	Mean	Std. D.	Treatment No.	*N*	Mean	Std. D.	*F*-Values	*p*-Values
Succinct paragraph structure	4.719	1.161	1	57	3.754	1.090	20.919	<0.001***
Humor	4.105	1.345	2	55	4.855	1.113	10.277	0.002***
Confidence	4.776	1.027	3	55	5.800	1.268	22.375	<0.001***
Example	4.263	1.421	4	51	3.667	1.227	5.389	0.022**

Section B: Dependent factors									
Treatment	N	Professionalism				Popularity			
		Mean	Std. D.	F-Values	p-Values	Mean	Std. D.	F-Values	p-Values
0	57	0.754	0.434	—		0.614	0.491	—	
1	57	0.702	0.462	0.393	0.532	0.281	0.453	14.177	<0.001***
2	55	0.418	0.498	14.536	<0.001***	0.764	0.429	2.940	0.089*
3	55	0.873	0.336	3.531	0.063*	0.745	0.440	3.406	0.068*
4	51	0.490	0.505	8.544	0.004***	0.451	0.503	2.902	0.091*

Notes: Treatment 0 – baseline; Treatment 1 – no succinct paragraph structure; Treatment 2 – high humor level; Treatment 3 –high confidence expression; Treatment 4 – no example; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[1]We confirmed that, with respect to a focal factor, except the comparative treatment, all the other groups were found to have no significant difference between them and the baseline.

We recruited 275 university students to participate in the experiment, [19] with almost equal numbers of participants in each group. We randomly assigned a version of a Q&A webpage selected from the aforementioned treatment groups and asked participants to browse the page for 15 minutes and then complete a questionnaire with the same questions presented in the survey.

5.2 Experiment Results

Table I1 in Appendix I reports the background information of the subjects. The table reveals that the subjects in the different groups exhibited no significant demographic differences, and they featured similar levels of familiarity and experience when using the Zhihu Q&A community platform, suggesting that the random assignment was successful. We conducted analysis of variance (ANOVA) on the data collected; the results are reported in Table 7. Section A of Table 7 shows that all the manipulations were successful—that is, the subjects in Treatment 1 (no succinct paragraph structure) indeed perceived the answer text as unorganized (no succinct paragraph structure) compared with the baseline ($3.754 < 4.719$, $p = 0.01$), whereas the difference of the succinct paragraph structure score was nonsignificant among the other groups, suggesting that our manipulation of no succinct paragraph structure in Treatment 1 was successful. Similarly, the results of Section A of Table 7 indicate that the manipulation of texts with more humor, more confident expression, and no examples in Treatments 2, 3, and 4, respectively, was successful.

Thus, we conducted ANOVA on the dependent factors in Section B of Table 7. With respect to succinct paragraph structure, the mean value of popularity (but not professionalism) in the baseline group (with succinct paragraph structure) was significantly higher than that of Treatment 1 (without succinct paragraph structure, $0.614 > 0.281$, $p < 0.001$). This suggests that the use of succinct paragraph structure enhances content popularity, which is consistent with the secondary data analysis and survey findings.

Regarding humor, the mean value of popularity in the baseline group (low humor) was lower than that of Treatment 1 (high humor) at a weak significance level ($0.614 < 0.764$, $p < 0.10$). In addition, the mean value of professionalism in the baseline group (low humor)

[19] The participants in the experiment were different from those who participated in the survey.

was significantly higher than that of Treatment 1 (high humor, 0.754 > 0.418, $p < 0.001$). Overall, the results suggest that the use of humor increases the likelihood of content becoming popular. However, the use of humor also led to a decrease in the perceived professionalism of the content communicated. These results are consistent with those obtained from our secondary data analysis and survey.

Regarding confidence, the mean values of both popularity and professionalism in the baseline group (low confidence expression) were lower than those of Treatment 3 (high confidence expression) at weakly significant levels (respectively, 0.614 < 0.745, $p < 0.10$; 0.754 < 0.873, $p < 0.10$). Together the results suggest that confidence expression increases the likelihood that content will become popular and be perceived as professional. Again, these results are consistent with those obtained from our secondary data analysis and survey.

Finally, with respect to examples, the mean values in the baseline group (with examples) were significantly higher than those of Treatment 4 (no examples) in terms of professionalism (0.754 > 0.490, $p < 0.01$), whereas the difference was weakly significant in terms of popularity (0.614 < 0.415, $p < 0.10$). Together the results suggest that the use of examples promotes perceived professionalism and increases the likelihood of becoming popular. These results are consistent with those obtained from the secondary data analysis and survey. As such, the results of the experiment corroborate our previous empirical analyses, which serve to further enhance the robustness of our findings.

6 Conclusion and Implications

Although advances in Internet technology have created unprecedented opportunities for large-scale dissemination of scientific knowledge through Q&A communities, the endorsement of professional content remains problematic, especially for nonexperts. Ironically, this paradox is also likely to become more salient given the ease of creating and disseminating fake scientific information and even abusive content on the Internet. Understandably, people are generally more attracted to eye-catching, entertaining content with strong socioemotional appeal than to professional, accurate technical details—particularly given the general information overload problem associated with the Internet.

Thus, producers of genuine scientific content must employ communication techniques to help them gain popularity without compromising professionalism in Q&A communities that focus on disseminating scientific knowledge. Given that the main users of Q&A communities are nonexperts and ordinary people, this means that communicating by using approaches that nonexperts both appreciate (and would thus "upvote") and perceive as professional. Professionalism is indispensable; otherwise, people may treat Q&A communities as mere entertainment venues rather than sources of high-quality professional scientific information, which would prevent communities such as Zhihu from achieving their objectives and would hinder their long-term development as knowledge-dispensing platforms.

In this study, we investigate the linguistic features and writing techniques that influence the popularity and perceived professionalism of scientific content. We found that linguistic features such as using examples and expressing confidence can simultaneously enhance both popularity and perceived professionalism. Using succinct paragraph structure can increase the likelihood of a content becoming popular without negatively impacting perceived professionalism. Notably, although using humor can increase content popularity, it may also reduce perceived professionalism. That may be the case because, in contrast to mass media platforms (Carlo, 2015), using humor on professional content communication platforms such as Q&A communities may convey that the author is not serious or credible, thus undermining perceived professionalism. The negative influence of humor on perceived professionalism suggests that using excessive humor to please nonexpert readers may result in negative repercussions. Although such humorous content would have a higher chance of becoming popular, given the lower perceived professionalism, readers may treat the content as merely entertaining, rather than informative, and fail to recognize its scientific value. These findings have important implications for both research and practice, as discussed in Section 6.1.

6.1 Implications of the Study

6.1.1 Implications for Research

This paper offers several implications for research. First, our paper contributes to the research on Q&A communities by being the first to formally and simultaneously examine the popularity and perceived professionalism of scientific content communication. Research on Q&A communities has predominantly focused on popularity or outcomes reflected by popularity rankings (e.g., Fu et al., 2015; Jin et al., 2017; Li et al., 2015; Rughiniş et al., 2014; Stoddard, 2015; Venkataramani & Asadullah, 2013). However, popularity is neither sufficient nor necessary for the perceived professionalism of knowledge content disseminated in Q&A communities—knowledge content may attract nonexpert readers based on socioemotive or entertainment value and become popular, even if it is not perceived as professional (Kim & Oh, 2009). When knowledge content is popular but is perceived as lacking professionalism, readers may treat it as a conversation piece rather than accepting it

as something to be assimilated into their knowledge base. Thus, a one-sided understanding may risk undermining the objectives of Q&A communities like Zhihu to disseminate scientific knowledge.

Second, we reviewed the relevant literature on science popularization, academic writing, and Q&A communities to identify several pertinent linguistic devices that can be employed to increase content popularity or professionalism in Q&A communities. Based on a series of empirical efforts, including secondary data analysis, survey, and experiment, our paper provides robust evidence that using various linguistic devices influences whether knowledge content is popular and is perceived as professional by nonexpert readers, who comprise the main users of Q&A communities. Specifically, we demonstrate that some of these devices (succinct paragraph structure) can increase popularity but not perceived professionalism. We also identified the linguistic devices that can simultaneously enhance both popularity and perceived professionalism—i.e., expressing confidence and using examples. Moreover, we highlighted the paradoxical nature of using humor to communicate scientific knowledge: while humor can increase the likelihood of popularity, it can also lower perceived content professionalism. These findings underscore the need to simultaneously consider popularity and professionalism—failing to consider one aspect may result in an incomplete understanding and inappropriate recommendations (e.g., the use of humor).

6.1.2 Implications for Practice

Our paper offers guidance for those interested in contributing scientific knowledge on Q&A sites and managers of Q&A communities. To knowledge contributors, our paper offers techniques for communicating knowledge to the main consumers of the content—namely, nonexpert readers—in a way that is likely to increase the popularity and enhance the perceived professionalism of the content. Specifically, our findings encourage knowledge contributors to pay attention to structuring their content in clear, concise paragraphs, expressing confidence, and using examples in their writing. We caution that while humor may increase the popularity of their writing, humor could hurt its perceived professionalism, which could undermine their goal of disseminating scientific knowledge. As a whole, the use of appropriate linguistic devices may help elevate their contributions above the noise present in Q&A communities.

To managers of Q&A communities interested in the dissemination of scientific knowledge, our research suggests that, if their goal is to implement platforms for sharing scientific knowledge rather than idle conversation, then relying solely on popularity as a means of recommending content to users is inadequate. As demonstrated in our preinvestigation, a salient inconsistency exists between the popularity and perceived professionalism of knowledge content. To increase both the popularity and perceived professionalism of knowledge content, managers should provide guidelines to contributors on how to communicate their knowledge more effectively. For instance, managers could offer contributors guidelines on the use of appropriate linguistic devices as they begin drafting their answers on the site's answer-entry page.

Moreover, with the rapid development of natural language processing and the increasing academic interest in this subject, including topics such as humor recognition (e.g., Chen & Soo, 2018) and metaphor recognition (e.g., Zeng, Lin, Zhou, & Chao, 2017), the linguistic factors that influence content popularity and perceived professionalism may be automatically detected using language processing tools in the near future. By using these tools, knowledge contributors would have the opportunity to learn about their writing in terms of different structural and semantic features and could make adjustments (such as increasing the confidence level) to make their writing more effective. Similarly, platform managers would be able to quickly analyze the knowledge content on their platforms in terms of the various linguistic indexes, thus enabling them to provide specific guidelines to contributors regarding how to write their articles in a way that facilitates popularity and/or perceived professionalism.

It is also important to note that, as with any tool, there is the possibility that the linguistic devices we investigated could be misused by people to raise the popularity and perceived professionalism of low-quality content. High-quality content is at the core of Q&A communities that focus on the dissemination of professional scientific writing; thus, managers of such communities must implement measures to routinely check the quality of content on their community platforms in order to safeguard the core mission of the Q&A community. For instance, renowned scholars in different domains, such as university professors, could be engaged as consultants to regularly monitor the community platform and to assess content quality and identify any abusive practices. To allow for more objective and scalable assessment of content quality, machine-learning methods may also be useful (see Chai et al., 2011).

6.2 Limitations and Future Research Directions

There are some limitations in the current research that should be recognized; however, these limitations also offer opportunities for future research. First, despite our efforts to review the linguistic devices investigated in the relevant literature streams, our list of relevant

linguistic devices is unlikely to be exhaustive. Future research may explore other linguistic devices and assess their ability to influence popularity and perceived professionalism. Second, we did not investigate the underlying mechanisms that the linguistic devices leverage to influence audience perceptions. Future research may wish to comprehensively explore these mechanisms. Third, we examined only the contributions of scientific knowledge in two knowledge domains (mathematics and biology) on a single Q&A community platform, which may limit the generalizability of our findings. Future research could examine other knowledge domains in similar Q&A communities to assess the robustness of our findings. Fourth, cultural factors may affect the influence of various linguistic devices. For instance, although we identified a negative effect of humor on perceived professionalism, whether this effect is true in cultures that are more receptive to humor is unclear (Bell, 2007). Future research could thus include various cultural contexts to assess the significance of this factor and its effects, as compared to our results. Another limitation of this study is that in the secondary data analysis, we selected and analyzed the top 50 answers to the questions recommended by the platform under study. This decision was based on the reality that answers on the platform beyond the top 50 attracted few or zero upvotes, making analysis of the popularity of these answers moot. An examination of the descriptive statistics (Table 1) reveals that the data include a fairly even coverage of different levels professionalism in the answers (mean = 5.14, min. = 0, max. = 9.83; standard deviation = 1.96), and no obvious bias was detected toward highly positive or negative answers. Nonetheless, this may affect the generalizability of our findings, and future research may wish to replicate our study in other contexts using other data sets in which a more inclusive analysis is viable. In addition, it would also be interesting to investigate the potential influence of platform features, such as how popularity is ranked beyond the number of upvotes. New platform features for evaluating and ranking content professionalism may be designed, and their effectiveness could be systematically assessed through future research experiments.

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Appendix A: Sample Webpage and Upvote Distribution of the Answers on Zhihu.com

Figure A1. An Example of Q&A Webpage of Zhihu.com

Figure A2. An Example of the Personal Homepage of a Zhihu.com User.

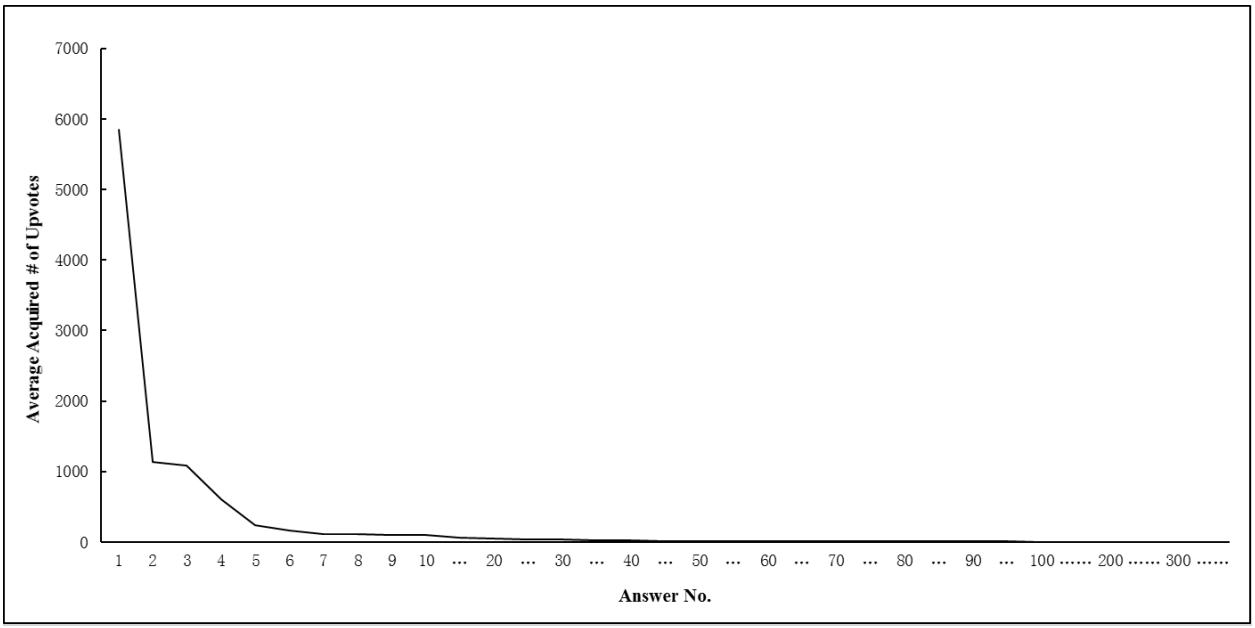

Figure A3. The Upvotes Distribution of Answers for the Sample Questions

Appendix B: Examples of Professionalism Assessment

Table B1. Examples of the Judgment on Professionalism

Question*: Is the Chinese style confinement in childbirth scientifically valid?					
Answers**		**Judgment*** **			**Interpretation**
		Accuracy	**Relevance**	**Clarity**	
1	"…We shall not be so stubborn as to practice the so-called Chinese-style childbirth confinement. But we do need devote attention to personal hygiene, rest, diet, exercise, etc. I suggest the following scientific gynecologic/obstetric puerperium: First, changes in genital system and how to deal with them…; Second, changes in the breast and how to deal with them…; Third, notes following childbirth…"	High	High	High	The contents are overall in line with modern medical science, and deliver detailed, relevant and clear information, which is useful.
2	"…Many young mothers suffer from backaches. Generally, the reasons include: First, progestin and oxytocin in the body soften the ligaments in the pelvis and lumbar spine…; Second, long labor or inappropriate positioning during labor can results in excessive pelvic pressure…; Third, bad posture during breastfeeding and the pregnancy posture increase the burden on the spine…"	High	Low	High	The contents are accurate and informative with clear logic, but do not answer the question directly.
3	"…It's correct to prevent people from catching cold and not to carry heavy things. Because the pelvic floor muscles are weak, carrying heavy things and holding the baby in your arms may lead to uterine prolapse. Even healthy people should be careful not to catch a cold, let alone puerpera. I don't care much about personal mouth hygiene, but not brushing teeth is unscientific. Is it because of the poor conditions in China's past?…"	High	High	Low	The contents are generally correct and relevant to the question, but they are expressed using bad logic.
4	"…It seems that foreign women do not practice confinement after childbirth. Only Chinese women do so. However, people in other countries commonly call the period after childbirth "puerperium," which lasts about six weeks. Modern medical science, no matter where, is in agreement that it takes time for the body to recover from childbirth…"	Low	High	High	The first sentence is incorrect, although the following explanation is generally clear and relevant to the question.
5	"I can tell you based on my personal experience that the amount of breast milk is unrelated to how much soup I eat. I seldom eate soup, and control my diet in order to lose weight. The amount of breast milk is also unrelated to how much other food I eat. I eat a lot of vegetables and fruits, and my breast milk always satisfies my baby ..."	Low	High	Low	The answer is based on individual experience, which is incorrect and is delivered with bad logic.
6	"…Do not discuss science with your mother or wife…"	Low	Low	Low	It is inaccurate, obscure, and provides little useful information to the readers. It even expresses gender discrimination to some extent.

Notes:
* This question was used in our survey. In traditional Chinese-style confinement after childbirth, a young mother is typically not allowed by other family members to brush her teeth, take showers, go outside, or do heavy exercise. The young mother stays in bed as much as possible and eats nutritious foods, especially soups.
** All the answers were in Chinese on Zhihu.com. *** We used a 3×10-points system along the three dimensions.

Accuracy: The content (1) does not conflict with scientific principles, (2) provides accurate scientific information.
Relevance: The content (1) is relevant to the question, (2) answers the question directly.
Clarity: The content contains (1) detailed information, and (2) clear logic.

Appendix C: Survey Questionnaire and Background Information of Participants

Table C1. Construct Operationalization*

No.	Constructs**	Items	Scales
Part 1.			
1	Popularity	I will up vote for this answer in Zhihu.com.	☐Yes ☐No
2	Professionalism	I think the content of this answer is professional.	☐Yes ☐No
			Strongly disagree → **Strongly agree**
3	Accuracy	I think the content of this answer provides accurate information.	1 → 10
4	Relevance	I think the content of this answer is relevant to the corresponding question.	1 → 10
5	Clarity	I think the content of this answer is presented clearly in a logical way.	1 → 10
Part 2.			
6	Length	I think the length of this answer is:	**Very short** … **Very long** 1 2 3 4 5 6 7
7	Humor	I think the answer is humorous.	**Strongly disagree** … **Strongly agree** 1 2 3 4 5 6 7
8	Confidence	I think the answer shows confidence in its argument.	**Strongly disagree** … **Strongly agree** 1 2 3 4 5 6 7
			Very limited … **Very adequate**
9	Typographical cue	The boldfaces used in this answer are (based on how their use is needed):	1 2 3 4 5 6 7
10	Image	The images used in this answer are:	1 2 3 4 5 6 7
11	Citation	The citations in this answer are:	1 2 3 4 5 6 7
12	Example	The examples (e.g. stories, cases, personal histories) used in this answer are:	1 2 3 4 5 6 7
21	Metaphor	The answer uses metaphorical language to explain the knowledge involved.	☐Yes ☐No
22	Succinct paragraph structure	The answer uses succinct paragraph structure.	☐Yes ☐No
23	Peer influence	My upvote decision of this answer is affected by the current votes number for the answer.	☐Yes ☐No
24	Rank influence	My upvote decision of this answer is affected by the occurring order of it.	☐Yes ☐No

Note: * Experts only answered questions 1-5; and questions 3-5 were answered by experts only. ** This column was hidden when the survey and experiment were conducted.

Table C2. Background Information of Survey Respondents*

Group	*N*	Gender	Age	Education	Topic familiarity	Use experience of *Zhihu*
Nonexperts**	255	0.643	21.447	1.529	3.816	4.390
Experts	240	0.550	25.300	2.450	4.881	4.475
Overall	495	0.598	23.315	1.976	4.332	4.431

Notes:
* Gender: 0 = female, 1 = male. Education: 1 = undergraduate students, 2 = master's candidates, 3 = PhD candidates.
Topic familiarity: 1 = very unfamiliar, 3 = normal, 5 = very familiar. Experience: 1 = seldom use, 3 = normal, 5 = frequently use.
** Major of non-experts: 111 (43.53%) in liberal science, 144 (56.47%) in natural science.

Table C3. Consistency Test Results on Professionalism for Experts

Subject	Que. ID	Ans. ID	Cronbach's α	Subject	Que. ID	Ans. ID	Cronbach's α
Mathematics	1	1	0.856	Biology	6	1	0.939
	1	2	0.891		6	2	0.770
	1	3	0.931		6	3	0.888
	1	4	0.865		6	4	0.869
	1	5	0.712		6	5	0.834
	1	6	0.865		6	6	0.888
	1	7	0.763		6	7	0.739
	1	8	0.796		6	8	0.714
	1	9	0.889		6	9	0.883
	1	10	0.727		6	10	0.901
	1	11	0.896		6	11	0.855
	1	12	0.867		6	12	0.874
	1	13	0.872		6	13	0.873
	1	14	0.724		6	14	0.743
	1	15	0.719		6	15	0.874
	1	16	0.805		6	16	0.818
	1	17	0.890		6	17	0.783
	1	18	0.835		6	18	0.805
	1	19	0.769		6	19	0.790
	1	20	0.842		6	20	0.745
Mathematics	7	1	0.944	Biology	10	1	0.733
	7	2	0.853		10	2	0.735
	7	3	0.785		10	3	0.898
	7	4	0.931		10	4	1.000
	7	5	0.863		10	5	0.803
	7	6	0.732		10	6	0.798
	7	7	0.795		10	7	0.861
	7	8	0.912		10	8	0.763
	7	9	0.870		10	9	0.836
	7	10	0.754		10	10	0.819
	7	11	0.700		10	11	0.787
	7	12	0.877		10	12	0.791
	7	13	0.740		10	13	0.831
	7	14	1.000		10	14	0.787
	7	15	0.829		10	15	0.766
	7	16	0.885		10	16	0.814
	7	17	0.765		10	17	0.744
	7	18	0.780		10	18	0.755
	7	19	0.880		10	19	0.839
	7	20	0.769		10	20	0.897

Table C4. Correlation Matrix of Constructs

	Mean	S. D.	Min	Max	1	2	3	4	5	6	7	8	9	10	11
Professionalism	0.318	0.466	0	1	1.000										
Popularity (Upvote)	0.392	0.489	0	1	0.263***	1.000									
Typographical cue	2.298	1.722	1	7	0.244***	0.038	1.000								
Succinct. para. stru.	0.655	0.476	0	1	0.141**	0.144**	0.208***	1.000							
Humor	4.608	1.429	1	7	-0.320***	0.148**	-0.092	-0.101	1.000						
Citation	2.043	1.63	1	7	0.251***	0.043	0.524***	0.111*	-0.027	1.000					
Metaphor	0.392	0.489	0	1	-0.100	-0.004	0.052	-0.110*	0.300***	0.161***	1.000				
Examples	2.279	0.478	1	7	0.093	0.083	0.180***	0.074	-0.046	0.171***	0.150**	1.000			
Confidence	4.196	1.289	1	7	0.119*	0.233**	0.112*	0.200***	-0.018	0.099	-0.010	0.163***	1.000		
Length	3.400	2.009	1	7	0.381***	0.024	0.340***	0.009	-0.241***	0.334***	0.184***	0.396***	0.157**	1.000	
Image	2.286	1.928	1	7	0.306***	0.081	0.552***	0.117*	-0.151**	0.486***	0.073	0.137**	0.061	0.332***	1.000

*S.D. is the standard deviation. * p < 0.10, ** p < 0.05, *** p < 0.01.*

Appendix D: Further Comparison of Content Popularity (Based on Secondary Data) and Professionalism

Apart from relying solely on user perceptual measures (perceived professionalism and upvote intention) to assess the consistency between the two outcomes, we also performed further testing using secondary data for the popularity measure (i.e., number of votes garnered by knowledge contents) and also expert assessment of professionalism. We invited three domain experts (senior PhD students of the relevant subjects) to measure the professionalism of each answer and asked them to finish the work in two weeks.[20, 21] They judged each answer using a 3×10-point system along the three dimensions of accuracy, relevance, and clarity (Wang & Strong, 1996; Kim et al., 2007). We calculated the professionalism score of each answer by taking a 2:1:1 weighted average of the three dimensions. Given that the Cronbach's α values are all higher than 0.7 (α=0.706), the coding of the three coders for professionalism were consistent (Price & Mueller, 1986).

To investigate whether the popularity of the contents in our data set (based on number of upvotes) correlated with evaluations of professionalism, we first calculated the correlation coefficient of the professionalism score and upvotes for each answer, which was only 0.39, showing that salient inconsistency between professionalism and popularity exists. More formally, we ranked the answers to each question according to their received number of upvotes (popularity) and professionalism scores, respectively, then we calculated the number and overlap ratio of answers that were ranked the top 7 and top 15 in both popularity and professionalism for each question. We also calculated Kendall's Tau with all the 50 answers to each question. Kendall's Tau is computed based on rank correlation within different groups, indicating similar ranking of components between groups if the value is close to 1 (Kendall, 1938). Table A-6 presents the results; it can be seen that most of the overlap ratios between ranking by professionalism and that by popularity are only around 50%, and the values of Kendall's Tau are mostly smaller than 0.5, suggesting that for the knowledge content in our data set, the number of upvotes they received is not always proportional to their professional quality score. The results underline the discrepancy between popularity and professionalism in our context.

Table D1 Comparison of Popularity and Professionalism of Answers

Que.	Math (*N*=7)		Biology (*N*=7)		Math (*N*=15)		Biology (*N*=15)		Math (*N*=50)	Biology (*N*=50)
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	Kendall's Tau	Kendall's Tau
1	5	71.43%	4	57.14%	10	66.67%	5	33.33%	0.326	0.294
2	3	42.86%	2	28.57%	5	33.33%	8	53.33%	0.074	0.499
3	2	28.57%	3	42.86%	9	60.00%	5	33.33%	0.396	0.213
4	4	57.14%	2	28.57%	8	53.33%	5	33.33%	0.469	0.211
5	2	28.57%	2	28.57%	7	46.67%	4	26.67%	0.169	0.220
6	4	57.14%	3	42.86%	7	46.67%	5	33.33%	0.048	0.264
7	4	57.14%	3	42.86%	10	66.67%	8	53.33%	0.275	0.151
8	5	71.43%	3	42.86%	11	73.33%	5	33.33%	0.486	0.318
9	6	85.71%	3	42.86%	6	40.00%	6	40.00%	0.685	0.078
10	6	85.71%	5	71.43%	13	86.67%	8	53.33%	0.692	0.265
11	3	42.86%	3	42.86%	9	60.00%	7	46.67%	0.195	0.313
12	4	57.14%		-	7	46.67%		-	0.210	-
Overall	48	57.14%	33	42.86%	102	56.67%	66	40.00%	0.335	0.257

[20] All information except that related to answer text content (e.g., number of upvotes received, information about the answer provider) was hidden in measuring professionalism in order to minimize confounding influences and biases.

[21] We sent a total of 20 invitations to the senior PhD students in the School of Mathematics, School of Economics, and the School of Life Sciences at a top Chinese university. After reviewing our questions, six of them (two in mathematics, one in economics, and three in life science) agreed to participate.

Appendix E: Literature Review

Table E1. Review of Relevant Literature on Q&A Communities

Author(s)	Focal issue	Research context	Dependent variable(s)	Independent variable(s)	Method	Main conclusions
Arai & Nur (2013)	Prediction of answer quality	Social Q&A (Yahoo! Answers)	Answer quality (based on human judgment)	• Use of citations, upvotes, downvotes; character length, word length, sentence length, membership tenure, etc.	Decision trees, Naïve Bayes	• Proposes a classification method to predict content quality
Fu et al. (2015)	Evaluation of answer quality	Social Q&A	Answer quality (measured as number of upvotes minus the number of downvotes)	• Textual features including length (count of characters, words, sentences); structure (how well the content is organized), style (use of auxiliary verbs, pronouns, conjunctions, prepositions, and short sentences); readability of texts. • User features (users' activities and expertise levels) • Reviews **(**number of edits/revisions, discussions and comments) • Networks features (PageRank, link count, and translation count)	Exploratory factor analysis (EFA)	• Features related to reviews (especially revision count and comment count) and users (count of merit badges, answers, and comments) are useful indicators of high-quality answers • The importance of textual features (length, structure, and writing style) varies across knowledge domains
Harper et al. (2008)	Prediction of answer quality	Social Q&A (Yahoo! Answers, Library Reference Services, etc.)	Answer quality (based on user judgment)	• Rhetorical strategies (gratitude or indicating prior effort). • Topic (technology, business, and entertainment). • Type (factual, opinion, and personal advice)	Secondary data analysis	• Rhetorical strategy had no significant effect on predicting answer outcomes. • Entertainment-oriented questions received many replies, but those replies were poor in judged quality relative to other topics. • Questions asking for advice received highest quality responses
Jin et al. (2017)	Factors influencing popularity	Social Q&A (Zhihu.com)	Popularity (number of upvotes)	• Number of votes, number of words, number of pictures, number of followers, number of friends, descriptions of author, number of answers the author had written	Secondary data analysis	• Number of pictures has a positive effect on the number of votes, while the effect of number of words is negative. • Social relationship of the author

						also influences content popularity.
Kim & Oh (2009)	Criteria that knowledge seekers employ in selecting the best answer to their question	Social Q&A site (Yahoo! Answers)	User criteria of best answer	• Content value, cognitive value (novelty, understandability), socioemotional value (gratitude, sympathy, and humor), information source value, extrinsic value, utility, and general statement	Text mining of comments (descriptive analysis)	• Socioemotional criteria were the most frequently employed criteria; while comments related to content and utility are also commonly employed
Kim (2010)	Assessing the credibility of answers	Social Q&A (Yahoo! Answers)	Credibility of answer (trustworthiness and expertise)	• Message-related criteria (e.g., accuracy, clarity, logic, grammar). • Source-related criteria (e.g., references, expertise) • Attitude-related criteria (e.g., having a good attitude)	Interview	• Users apply message-related criteria (e.g., accuracy, clarity, logic, grammar) with greater frequency than source-related criteria (e.g., references, expertise) in assessing the credibility of answers • An answerer's attitude influence is thought to influence credibility as well. Being nice, showing seriousness or empathy positively influence credibility.
Li et al. (2015)	Identifying the characteristics of high-quality answers	Academic Q&A (Research-gate)	Answer quality (measured as number of upvotes)	• Web captured features including researcher's participation, answer length, response time, etc. • Human coded features including social elements (such as saying "Hello!" or "Thank you!"), provisions of citation, opinion, experience, etc.	Case study	• Responders' authority, shorter response time and greater answer length are the critical features that positively associate with the peer judgment of answer quality. • Answers containing social elements are very likely to harm the peer-judged answer quality.
Liu et al. (2008)	Prediction of user satisfaction	Social Q&A (Yahoo! Answers)	Satisfaction of askers (based on human judgements Of users from Mechanical Turk)	• Question; question-answer relationship; asker history; answer history; category features	Decision trees, SVM	• Proposes a classification method to predict user satisfaction of answers in social Q&A communities
Oh et al. (2012)	How users rate answer quality in comparison to experts	Online health answers in social Q&A	Answer quality	• Accuracy, completeness, relevance, and objectivity of the answer content; • Source credibility, readability, politeness, confidence, knowledge, and efforts of the answer provider	Survey, mainly ANOVA analysis	• Users rate answers higher than experts in almost all criteria; educational efforts are needed to reduce the gap.

Rughiniș et al. (2014)	Factors influencing popularity	Super answers on Q&A community: (Quora)	Answer visibility; Upvotes	• Word count, number of followers, and use of visual representations	Secondary data analysis	• Visibility and upvotes are tightly bound • Number of votes depends on the number of followers and word count, and also on using pictures or illustrations
Shah & Pomerantz (2010)	Prediction of content quality	Social Q&A (Yahoo! Answers)	Answer quality (human judgment of users from Mechanical Turk)	• Lengths of the question's subject, question's content, and answers for the question; number of comments for the question; • information from the asker's profile; length of the answer's content; use of citation; rank of the answer	Secondary data analysis	• Features extracted from questions do not help much in prediction (not significant), whereas features extracted from answers achieve statistical significance but only with a pseudo R^2 of 0.1386.
Stoddard (2015)	Estimation of content quality	Top-ranked articles of Hacker News and Reddit	Answer quality	• Time-series of upvotes	Secondary data analysis	• Propose a method to estimate answer quality based on relative number of votes an article received

Table E2. Major Linguistic Devices Investigated in the Relevant Literature

Category of linguistic devices	Specific feature	Research on science popularization	Research on academic writing	Research on Q&A communities	This study
Structural linguistic devices	Succinct paragraph structure	Parsons (1990); James (1984); Nwogu (1991)	Calisir & Gurel (2003); Yano et al. (1994)	Fu et al. (2015); Dalip et al. (2011)	Included in this study as presence/absence of succinct paragraph structure
	Typographical cues (boldface/underlining/ italics)	Myers (2003); Giannoni (2008)	Britton et al. (1982); Lorch et.al (1995); Frase & Schwartz (1979); Ozuru et al. (2009)	Chai et al. (2011) Agichtein et al. (2008), Dalip et al. (2011)	Included boldface as the typographical cue in our study, since other cues such as underlining and italics are not common in the scientific texts in our data set
	Citation/reference/ external link (how sources are presented)	Sprecker (2002); Horibe (2015); Oliveira & Pagano (2006)	Hass (1981); O'Keefe (2002); Luchok & McCroskey (1978); Thomm & Bromme (2016)	Arai & Nur (2013); Dalip et al. (2011); Kim and Oh (2009); Kim (2010); Oh et al. (2012); Shah & Pomerantz (2010)	Citation use is included in this study
	Imagery	Miller (1998); Gruber & Dickerson (2012)	Berger (1989); Allen (2002); Macedorouet et al. (2003).	Dalip et al. (2011); Harper et al. (2008)	The use of images is not prevalent in the contents of the Q&A community investigated in this study. Nonetheless, we included it as control (number of images) in this study
	Length	-	-	Arai and Nur (2013); Chai et al. (2011); Fu et al. (2015)	Included as control (number of words) in this study
Semantic linguistic devices	Humor	Myers (1990); Gotti (2014); Giannoni (2008)	White (2001); Schmitz (2002); Schmidt & Williams (2001); Worthen & Deschamps (2008); Hayati et al. (2011); Ferstl and Putzar (2016)	Kim & Oh (2009); Zhu et al. (2009)	Included in this study
	Metaphor	Emmeche & Hoffmeyer (1991); Keller (1995); Rothbart (1997); Calsamiglia and Dijk (2004); Gülich (2003); Camus (2009); Ciapuscio (2003)	Inhoff et al. (1984); Gibbs & Gerrig (1989)	Harper et al. (2008)	Included in this study

	Examples	Calsamiglia & Dijk, (2004); Gülich. (2003); Ciapuscio (2003); Carlo (2015)	Flowerdew (2000); Hyland (2004)	Li et al. (2015); Zhu et al. (2009) Shah & Pomerantz (2010)	Included in this study
	Confidence (e.g., use of hedges and boosters)	Hyland (2010); Hyland (2002)	Bazerman (1988); Swales (1990); Jensen (2008)	Kim & Oh 2009); Oh, et al.(2012); Kim(2010)	Included in this study
	Denomination and definition/descripttion	Candel (1994); Calsamiglia & Dijk (2004)	-	-	They deal with specifying and explaining unknown words and things, which are basic in a domain but unfamiliar to the public (genome being an example). Given that they may only appear in the initial posting and not used subsequently (e.g., basic definitions), we do not include them in this study
	Narratives	Seguin (2001); Myers (1994); Calsamiglia & Dijk (2004)	Georgakopoulou (2006); Holmes (2005)	-	The use of narrative is rather complex and a highly deliberate measure (with procedures of making up a story such as manipulation, competence, performance, and recognition), which is not evident in the context of this study, and is thus not included

Appendix F: Consistency Test of Variable Coding

Table F1. Consistency Test Results

Variable	Cronbach's α			
	Math	Biology	Overall	Criterion
Professionalism	0.701	0.735	0.706	0.7 (Price & Mueller, 1986)
Succinct paragraph structure	0.811	0.731	0.775	
Metaphor	0.813	0.788	0.795	
Examples	0.709	0.718	0.711	
Humor	0.782	0.840	0.806	

Appendix G: Correlation Matrix

Table G1. Correlation Matrix
(Overall)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Professionalism	1														
Popularity	0.39***	1													
Length	0.36***	0.37***	1												
Confidence	0.09	0.14*	0.13*	1											
Humor	-0.18**	0.40***	0.25**	0.03	1										
Metaphor	-0.06	0.14*	0.34***	0.35***	0.35***	1									
Example	0.15*	0.33***	0.41***	0.04	0.18**	0.23**	1								
Succinct paragraph structure	0.09	0.25**	0.23**	0.18**	0.04	0.18**	0.20**	1							
Image	0.13*	0.21***	0.20**	0.14*	-0.03	0.15**	0.12*	0.17**	1						
Typographical cue	0.08	0.13*	0.36***	0.18**	0.19**	0.20**	0.13*	0.22**	0.32***	1					
Citation	0.12*	-0.11*	-0.15*	0.07	0.08	0.29***	0.05	-0.12*	0.34***	-0.13*	1				
Topic matched	0.14*	0.20**	0.26**	0.14*	0.08	0.18**	0.13*	0.14*	0.25**	0.32***	0.18**	1			
Answered questions	0.01	0.04	-0.02	-0.07	-0.01	-0.04	-0.02	-0.03	-0.01	-0.02	-0.02	0.01	1		
No. of followers	0.13*	0.15**	0.14*	0.08	0.04	-0.03	0.08	0.05	0.15*	0.05	0.11*	0.01	0.30***	1	
No. of followings	0.01	0.02	0.02	0.05	0.05	-0.04	0.09	0.01	0.19**	0.02	0.23**	0.03	0.13*	0.31***	1
Note: * p < 0.10, ** p < 0.05, *** p < 0.01															

Table G1. Correlation Matrix (Mathematics)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Professionalism	1														
Popularity	0.40***	1													
Length	0.32***	0.30***	1												
Confidence	0.27***	0.13*	0.20**	1											
Humor	0.12*	0.36***	0.19**	0.01	1										
Metaphor	-0.11*	0.15*	0.37***	0.38***	0.37***	1									
Example	0.19**	0.32***	0.38***	0.02	0.16**	0.28***	1								
Succinct paragraph structure	0.13*	0.30***	0.27***	0.18**	0.08	0.24**	0.24**	1							
Image	0.12*	0.20**	0.10*	0.17**	-0.05	0.27***	0.16**	0.25**	1						
Typographical cue	0.10*	0.18*	0.41***	0.20**	0.23**	0.24**	0.15*	0.24**	0.39***	1					
Citation	0.19**	0.05	-0.19**	-0.12*	-0.08	-0.10*	0.28***	-0.12*	0.26***	-0.15*	1				
Topic matched	0.18**	0.25**	0.23**	0.17**	0.09	0.21**	0.14*	0.20**	0.24**	0.34***	0.14*	1			
Answered questions	-0.05	0.02	0.01	-0.05	0.03	-0.06	-0.03	-0.04	-0.01	-0.01	-0.01	0.04	1		
No. of followers	0.15*	0.16**	0.15*	0.10*	0.06	-0.04	0.09	0.04	0.10*	0.06	0.09	0.01	0.32**	1	
No. of followings	0.02	0.02	0.03	0.04	0.05	-0.02	0.06	0.02	0.16**	0.04	0.25**	0.02	0.16**	0.31***	1
Note: * p < 0.10, ** p < 0.05, *** p < 0.01															

Table G1. Correlation Matrix (Biology)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Professionalism	1														
Popularity	0.44***	1													
Length	0.36***	0.43***	1												
Confidence	0.09	0.17**	0.06	1											
Humor	-0.14*	0.43***	0.33***	0.09	1										
Metaphor	-0.07	0.18**	0.33***	0.34***	0.40***	1									
Example	0.13*	0.35***	0.44***	-0.01	0.22**	0.20**	1								
Succinct parag. structure	0.08	0.23**	0.18**	0.19**	0.05	0.14*	0.15*	1							
Image	0.15*	0.22**	0.19**	0.15*	-0.08	0.20**	0.13*	0.19**	1						
Typographical cue	0.11*	0.11*	0.33***	0.13*	0.21**	0.21**	0.13*	0.17**	0.45***	1					
Citation	0.12*	-0.10*	-0.16**	0.07	-0.09	0.09	0.05	-0.13*	0.39***	-0.16**	1				
Topic matched	0.20**	0.18**	0.22**	0.10*	0.11*	0.18**	0.12*	0.05	0.33***	0.28***	0.25**	1			
Answered questions	0.01	0.04	-0.03	-0.06	-0.04	0.02	-0.01	-0.02	-0.02	-0.03	-0.02	0.02	1		
No. of followers	0.14*	0.12*	0.11*	0.07	0.04	-0.05	0.07	0.05	0.17**	0.06	0.16**	0.01	0.27***	1	
No. of followings	0.01	0.01	0.01	0.07	0.05	-0.03	0.09	0.01	0.22**	0.02	0.22**	0.03	0.11*	0.33***	1
Note: * p < 0.10, ** p < 0.05, *** p < 0.01															

Appendix H: Robustness Check Results

Table H1. Estimation Results with Alternative Measurement of Professionalism

Variables	Mathematics		Biology		Overall	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Intercept	1.20	0.20***	4.27	0.17***	2.16	0.27***
Succinct paragraph structure	0.29	0.26	0.39	0.25	0.31	0.21
Typographical cue	0.02	0.02	0.07	0.05	0.03	0.02
Metaphor	-0.42	0.32	0.22	0.17	-0.44	0.38
Humor	-0.32	0.17*	-0.26	0.07***	-0.20	0.10**
Confidence	1.26	0.37***	0.69	0.12***	0.96	0.20**
Example	0.52	0.23**	0.19	0.09**	0.26	0.14*
Citation	0.37	0.16**	0.19	0.10*	0.09	0.05*
Length	0.63	0.07***	0.39	0.03***	0.51	0.05***
Image	0.22	0.10**	0.11	0.06*	0.23	0.12*
Topic matched	-0.16	0.47	0.05	0.25	-0.10	0.32
Answered questions	-0.01	0.03	0.04	0.06	0.08	0.06
No. of followers	0.06	0.03*	0.13	0.06**	0.09	0.05*
No. of followings	0.01	0.07	0.01	0.03	0.01	0.06
Adjusted *R* square	0.338		0.401		0.368	
N	600		550		1,150	

Notes: * p < 0.10, ** p < 0.05, *** p < 0.01

Table H2. Estimation Results for Different Subtopics (DV: Popularity)

Variables	Mathematics				Biology			
	Theoretical		Applied		Nature		Humans	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Intercept	-1.93	0.52***	-1.16	0.37***	-1.97	0.37***	-2.57	0.48***
Succinct paragraph structure	0.33	0.19*	0.85	0.30***	0.51	0.24**	1.10	0.30***
Typographical cue	0.16	0.11	0.07	0.04*	0.19	0.15	0.12	0.12
Metaphor	0.53	0.30*	0.03	0.33	0.27	0.24	0.80	0.61
Humor	0.27	0.12**	0.49	0.13***	0.71	0.15***	0.61	0.16***
Confidence	0.35	0.38	-0.07	0.30	0.07	0.28	0.40	0.29
Example	0.83	0.24***	0.32	0.19*	0.42	0.22*	0.23	0.12*
Citation	-0.10	0.11	-0.23	0.15**	-0.06	0.09	-0.14	0.20
Length	0.15	0.13	0.21	0.12*	0.14	0.10	0.24	0.18
Image	0.07	0.12	0.21	0.18	0.04	0.05*	0.12	0.18
Topic matched	0.17	0.35	-0.13	0.61	-0.26	0.68	-0.42	0.54
Answered questions	-0.03	0.03	-0.06	0.09	-0.03	0.18	-0.03	0.15
No. of followers	0.12	0.05**	0.09	0.05*	0.08	0.05*	0.10	0.05**
No. of followings	0.01	0.08	0.01	0.09	0.01	0.02	-0.01	0.01
Adjusted R square	0.286		0.313		0.306		0.309	
N	350		250		250		300	

Notes: * p < 0.10, ** p < 0.05, *** p < 0.01.

Table H3. Estimation Results for Different Subtopics (DV: Professionalism)

Variables	Mathematics				Biology			
	Subtopic 1		Subtopic 2		Subtopic 1		Subtopic 2	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Intercept	2.78	0.46***	2.14	0.53***	2.45	0.35***	1.63	0.29***
Succinct parag. structure	0.37	0.20*	0.27	0.18	0.14	0.25	0.21	0.19
Typographical cue	-0.02	0.02	0.03	0.04	0.08	0.05	0.07	0.04*
Metaphor	-0.10	0.27	-0.28	0.43	0.04	0.24	0.12	0.20
Humor	-0.28	0.11**	-0.15	0.16	-0.26	0.15*	-0.20	0.10**
Confidence	1.35	0.35***	0.74	0.39*	0.22	0.09**	0.14	0.08*
Example	-0.07	0.23	0.60	0.24**	0.82	0.21***	0.27	0.11**
Citation	0.33	0.10***	0.16	0.08**	0.13	0.06**	0.08	0.05*
Length	0.38	0.07***	0.77	0.09***	0.40	0.08***	0.68	0.05***
Image	0.41	0.12**	0.20	0.10**	0.09	0.06	0.23	0.12**
Topic matched	-0.15	0.33	0.14	0.18	0.36	0.69	0.03	0.35
Answered questions	-0.03	0.09	-0.09	0.18	-0.15	0.06	0.06	0.15
No. of followers	0.08	0.04**	0.05	0.03*	0.09	0.05*	0.14	0.06**
No. of followings	0.01	0.07	0.01	0.07	0.01	0.02	0.01	0.03
Adjusted R square	0.404		0.375		0.421		0.527	
N	300		300		250		300	

** $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*

Appendix I: Background Information of Subjects Participating in Experiment

Table I1. Background Information of Subjects in Experiment*

Treatment	*N*	Gender	Age	Education	Topic familiarity	Use experience of *Zhihu*
0	57	0.509	22.333	1.842	4.140	4.667
1	55	0.509	22.273	1.745	4.264	4.945
2	55	0.518	22.418	1.782	4.182	4.682
3	51	0.490	22.725	1.784	4.167	4.725
Overall	218	0.507	22.431	1.789	4.188	4.754

Notes:
* Gender: 0 = female, 1 = male.
Education: 1 = undergraduate students, 2 = master's candidates, 3 = PhD candidates.
Topic familiarity: 1 = very unfamiliar, 3 = normal, 5 = very familiar. Experience: 1 = seldom use, 3 = normal, 5 = frequently use.

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