

# Microblog Credibility Perceptions: Comparing the United States and China

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## ABSTRACT

Microblogs have become an increasingly important source of information, both in the U.S. (Twitter) and in China (Weibo). However, the brevity of microblog updates, combined with increasing access of microblog content through search rather than through direct network connections, makes it challenging to assess the credibility of news relayed in this manner [34]. This paper reports on experimental and survey data that compare the impact of several features of microblog updates (author's gender, name style, profile image, location, and degree of network overlap with the reader) on credibility perceptions among U.S. and Chinese audiences. We reveal the complex mechanism of credibility perceptions, identify several key differences in how users from each country critically consume microblog content, and discuss how to incorporate these findings into the design of improved user interfaces for accessing microblogs in different cultural settings.

## Author Keywords

Twitter, Microblogs, Credibility, Cultural differences.

## ACM Classification Keywords

H.5.m [Information interfaces and presentation (e.g., HCI)]: Miscellaneous;

## INTRODUCTION

Social media are becoming an important and general information source beyond status post sharing within social networks [27]. Every day, more than 1.6 billion queries are issued on Twitter's search portal [49], and major search engines like Google [12] and Bing [46] have integrated status updates in order to provide timely and socially-relevant information. The rise in prominence of social media as an information source has led to an increase in the scrutiny of the credibility of these sources from mainstream media and researchers alike. This scrutiny is not unfounded, as end users are particularly wary of content posted to social media. Schmierbach and Oeldorf-Hirsch [45] showed that even when describing the same stories, people viewed the information on a website as more credible than the

information on a Twitter feed. Thus, to best leverage the potential of social media as an information source, we need to design user experiences that maximize both the credibility and the perception of credibility of social media-based content.

Researchers have started to understand the mechanisms of microblog credibility perception. A recent study conducted by Morris et al. [34] revealed that people rely on a variety of non-text clues when assessing tweet credibility, identifying message topic, user name, and profile image as features that affect users' perceptions. They also found that altering the profile image made a greater difference in the context of entertainment topics than for science or political topics. This suggests that the factors influencing tweet credibility perception can be diverse, making the mechanism underlying perceptions of credibility complex and hard to predict.

Culture also influences people's preferences and use styles in sociotechnical systems [62, 63]. In particular, there are significant differences between the West (e.g., North America and Europe) and East Asia, corresponding to the contrasts between the analytic and holistic cognitive patterns and between the individualism and collectivism social orientations [30, 36]. These cognitive patterns and social orientations co-evolve with a number of cultural factors, including the development of a country's political systems [14], economic ideology [42], industrialization [26], intellectual traditions (Aristotelian vs. Confucian) [29, 40], languages [56], and religions [8]. Within the technology domain, these cultural characteristics may affect how information is created and used, causing significant challenges in designing for information sharing in social media across cultures. In this study, we contrast the United States and China to identify and understand differences in how information and users are perceived in social media in each country. This is particularly timely and important given the exploding use of microblogging in China, where the two most popular microblogging services have 324 million and 425 million users respectively [22].

To our knowledge this is the first systematic study investigating cultural differences in how people perceive the credibility of social media content. Our results describe how several profile factors (gender, name style, profile image, location, and network overlap) and the topical domain of the content itself interact with one another and

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CSCW '13, February 23–27, 2013, San Antonio, Texas, USA.

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with culture to affect credibility assessments. We first show a number of main effects and interactions of these features on credibility perceptions. Next, consistent with their high-context cultural characteristic, we show that Chinese respondents demonstrated stronger effects and more complex interactions among these social media features. We then discuss how to incorporate our understanding of these credibility perception mechanisms into user experiences for consuming microblog content.

## RELATED WORK

### Microblogs and Credibility

Due to the efficiency, volume, and timeliness of information, microblogging services (e.g., twitter.com and weibo.com) have become prominent information sources [27]. According to the Twitter blog, there were on average 340 million tweets generated per day as of March 2012 [54]. In addition to receiving information from people that they “follow,” people have been increasingly searching for topically-relevant tweets (e.g., the over 1.6 billion queries of Twitter’s search portal per day). In particular, learning about breaking news is often an important motivation for people to read tweets [51], for example, in order to keep updated on local emergencies [58].

To serve this huge information demand, major third-party search engines such as Google [12] and Bing [46] have incorporated microblog updates into their search results. Encountering microblog posts through search, rather than through network relationships, increases credibility concerns [34]. To start to tackle this and related issues, researchers have been working on filtering and recommendation algorithms that can help identify topically-relevant tweets or high-authority information (e.g., [4, 38]), and some interactive tools have also been developed to aid information finding and exploration of Twitter content such as [2, 43].

Nonetheless, the speed and volume of the spreading of various kinds of undesirable information, such as spam [35, 44, 50], surreptitious advertising [15], imposter accounts [37, 53], and false rumors [6, 24, 32, 41] have surfaced serious concerns about the veracity of microblog posts. Thus it is crucial to understand how and how well people make assessments of credibility of microblog content. This understanding can guide the design of tools that help people to make informed, high quality judgments about content and source credibility of microblog information.

Due to the decentralized nature of the Internet, the credibility of online information has long interested researchers and practitioners. Information scientists have identified important dimensions (e.g., authority, accuracy) and models (e.g., cognitive authority) in credibility assessment (see [33] for a complete review). The factors that may affect Web page credibility perceptions, for example, can be very diverse, including visual features [28], user factors (e.g., prior experience [9]), technical

properties (e.g., web functionality [11]), and the context of encountering the content (e.g., search engine ranking [19]). Integrating these findings, some techniques have been designed to support credibility assessment in search results [47] [60].

In contrast, research on microblog credibility is relatively nascent and faces new challenges and opportunities. Different from Web pages, the compact content (usually a limit of 140 characters) and brief author profile in microblog environments provides relatively sparse information for consumers to leverage when making credibility judgments. This paucity of contextual information is exacerbated when microblog content is presented in mainstream search results, as the content is even further removed from information about the author. Finally, while some work has shown promise in using structural and time-series features (e.g., [41, 44]), there is no standard algorithmic solution for automatically identifying credible tweets analogous to using PageRank to identify high quality web pages.

Given the strong social component of microblogs as an information source, algorithmic solutions to content selection would do well to incorporate an understanding of human cognition. Identifying the factors that influence credibility judgments in the minds of users not only can enhance the feature set for machine learning approaches to content selection, but also can suggest proper information presentation for tweets in varying contexts. To identify such influential factors, Pal and Counts [39] examined how the user name can affect whether people consider a tweet “interesting” or the author “authoritative.” They found that more popular authors (with more followers), names representing organizations, and topically-related names contributed to higher ratings of the content and the author. In their survey study, Morris et al. [34] revealed that various tweet features might impact credibility assessments, such as “contains URL,” “bio suggests topic expertise,” and “account has verification seal.” Morris et al.’s experiments also indicated that the tweet features might interact with different topical contexts. For example, the difference of default image versus other image types appeared to be the strongest for tweets on the topic of entertainment. This implies that users’ credibility perception might be context-dependent.

### Microblogging in China and Cultural Differences

Since the first notable microblog service Fanfou (饭否) was launched with its beta version in 2007, China has experienced an astonishing growth of microblog services, or Weibo (in Chinese *Pinyin*). There now are several popularly used Weibo services, including Sohu Weibo, NetEase Weibo, and Tencent Weibo. As mentioned, the largest among them, Sina Weibo and Tencent Weibo reach 324 million and 425 million users respectively [22] (Twitter, in contrast, had 100 million active users as of September 2011 [55]). Note that the Chinese government actively

censors many forms of media, including the Internet; consequently Twitter, the iconic example of microblogging in the West, is banned in China.<sup>1</sup>

Significant cultural differences exist between the West and East Asia, notably the contrasts between the analytic and holistic cognitive patterns, and between the individualism and collectivism social orientations [30, 36]. Related to these two cultural dimensions, high- and low- context is one index related to information processing and communication. High-context (corresponding to East Asian cultures) is characterized by implicit and nonverbal expression, high uncertainty, and situational and context-based knowledge in communication. This corresponds to East Asians' strong and long-term social relationships and high value on the interdependence and connectedness in their social structure. In contrast, people of low-context cultures use explicit and transferable knowledge, and maintain a greater number of weaker and independent social relationships [17, 52]. As mentioned, these cultural characteristics may co-evolve with a number of cultural factors (e.g., the development of a country's political systems [14], economic ideology [42], and intellectual traditions [29, 40]). With respect to the technology domain, these interactions among the various cultural factors may affect how information is produced and disseminated, and shape the technology status and system designs in a country. In particular in China, perceptions of media credibility may also be influenced by the culture of government censorship and the on-going dramatic social and technical transformation. In this paper, we use the term "culture" to broadly encompass these many intertwined factors.

In the field of CSCW, Asian users have been found to prefer features supporting high-context communication, such as multi-party chat, audio-video chat, and emoticons in Instant Messaging (IM) [25], and to be less satisfied with asynchronous communication [31]. Yang et al. [63] revealed that Asian users prefer IM over a scheduling tool, express less sentiment in electronic conversations, and vary their sentiment levels more depending on contexts. [48] and [1] also found that Asian users tend to integrate more contextual and social concerns when choosing an appropriate medium for communication and motivating social queries.

Cultural differences have been found in profile presentation in online social media. For example, U.S. students disclosed more than Chinese students on a variety of topics [5], and Chinese users prefer to customize their profile images more than Americans [64]. However, to our knowledge, there is no literature about cultural differences in *perceiving* the information credibility in social media. Given the

tremendous volume of information generated and huge popularity of microblogs in China, it is important to know whether people share similar patterns in credibility perception and whether credibility-relevant algorithms and designs can be transferred into another culture (e.g., from the research on U.S. users in [34] to users in China). In fact, Yang et al.'s [62] cross-cultural study on community based Q&A sites suggests that even using very similar designs, people might behave very differently across sites because of a complex interaction between cultural characteristics and social-technical status.

As such, we examine culture as an influence on perceptions of content credibility in microblogs. To do so, we compare the effects of various pieces of tweet metadata on credibility perceptions among U.S. and Chinese participants. In terms of the metadata, as described in detail below, we start with factors that [34] examined in a U.S. context (gender, user name, profile image), and then add the additional factors of location and degree of network overlap that we hypothesize will be valued differently by Western and East Asian cultures. Our hypotheses below detail our predicted effects of each type of metadata on U.S. versus Chinese participants, along with a cultural differences-based rationale in each case.

## RESEARCH QUESTIONS AND STUDY DESIGN

In order to test for differences in microblog credibility perceptions between the U.S. and China, we ran an online study in which participants rated the credibility of stimuli tweets, with each of the factors of interest manipulated. In this section we describe the profile factors introduced above and associated hypotheses, followed by our study design and content creation process.

### Study Factors and Hypotheses

**Gender.** Gender differences have been shown to impact perceptions of credibility of information and people in other media (e.g., [7, 10]), though Morris et al. [34] found no impact of gender on credibility perceptions of tweets by U.S.-based users. We manipulated gender by varying whether the author's image was male or female (user names were selected to be gender-neutral).

**H1:** Overall, people will find tweets from men more credible than those from women.

**H1a:** This gender effect will be more pronounced in China than in the U.S., because China is higher than the U.S. in its masculinity index, which implies that the values of genders differ more in China [21], and furthermore Chinese females are traditionally less preferred and of lower socio-economic status (e.g., in [3, 16]).

**H1b:** This gender effect will be more pronounced for political tweets because the credibility of men and women will be more equitable for health than for political content, since prior studies show that generally men are more interested and informed in politics [57].

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<sup>1</sup> For brevity we use the term "tweet" generically throughout this paper to refer either to microblog posts on Twitter or to those on the Chinese Weibo services.

**User name.** The user name presents a unique piece of information about the author, and has been shown to systematically bias perceptions of authors and of those authors' content [34, 39]. For user name style, we extracted the two most polarized conditions found among U.S. users in [34]: *topical-style* (e.g., "Political\_news" and "健康资讯") and *Internet-style* (e.g., "Akalala99" and "Sleep 休止符"). We verified that these names were gender-neutral, and were not actual registered account names on the relevant microblog services.

**H2:** People will find tweets from users with topical user names more credible than those with Internet-style user name. This replicates the finding in [34].

Given the stronger influence of social context, Chinese respondents might be more influenced by differences in user name style (who the tweet is from is particularly important). However, the direction of this influence may be driven by different factors. For example, a topical user name may indicate profession and dedication in a particular topical area, but also may be related to certain intentions to spread spurious information or spam. With respect to the censorship in China, some authors who provide quality but politically sensitive content may want a non-topical user name to avoid censorship. Thus we make no specific prediction about how username style interacts with culture and topical domain, but we explore this issue in depth.

**Profile image.** The profile image can provide rich identifying and self-disclosure information about the author. [34] found that authors using the default Twitter icon received lower credibility assessments by U.S.-based users. Chinese users might have different perceptions on the variety of profile images, for example, [64] found that customizing one's profile image is more prevalent than using untreated photos in Chinese SNS sites.

For the profile image, we used either a photo of the author (*Photo*), or a generic icon depicting a gendered silhouette (*Anonymous*) (Figure 1). Coloring (pink for women and blue for men) was used to further distinguish between genders in the *Anonymous* condition (this color-gender association is common in both the U.S. and China). Images in the *photo* condition were selected from profile images of real social media users who were young adults with simple headshots (a method also used in [34]). All photos used for the U.S. version of the experiment depicted people of Caucasian heritage, while those used in the Chinese version depicted people of Asian descent.

**H3:** People will find tweets using photos as profile images more credible than those using anonymized images. This also replicates the finding in [34].

**H3a:** This effect will be less pronounced for Chinese respondents, because they might be more accepting of using anonymous photos as a way to avoid censorship.

**Location.** The location of the author might imply some latent properties of the author, such as political views and educational or socio-economic status [13]. Prior studies have shown that authors on Twitter often obscure or generalize their true location for a variety of reasons [14], though the presence of accurate location information on microblogs may be important since U.S.-based users reported in a survey that Twitter authors whose location is near to their own location are viewed as more credible [34].

For the author's location, we manipulated whether the location was stereotyped as being *liberal* or *conservative*. To select locations for the U.S. experiment, we used a 2010 Gallup Poll [23] listing the most liberal and conservative states. We chose eight states from each list, and then selected two cities from each state (for a total of 32 city/state pairs). Cities were chosen by viewing the Wikipedia entry for the given state, which features lists of large and small cities. For the liberal states, two of the large cities were selected, and for the conservative states, two small cities were chosen (since larger cities tend to be associated with liberalism [59]). Examples of locations constructed in this manner include "Portland, Oregon" and "Cambridge, Massachusetts" (liberal) and "Biloxi, Mississippi" and "Provo, Utah" (conservative). In China, the differentiation between liberal and conservative corresponds mainly to a few large cities on the East Coast versus the small and under-developed interior areas. Thus, we randomly selected from the counties in the 4 metropolises like Beijing and Guangzhou for liberal locations, and non-capital cities in interior provinces like Gansu and Jiangxi for conservative locations.

**H4:** Participants will find tweets from people in more liberal locations to be more credible than tweets from people in more conservative locations. This is because for both countries, people from more liberal regions are more likely to have better access to information and new technologies, and in general they also tend to be associated with higher educational background and better economic status than people from more conservative regions [13].

**H4a:** This effect will be less pronounced in the U.S. because its level of modernization is more uniform than China.

**H4b:** This effect will be more pronounced for political tweets because we anticipate that the location difference will matter more in access to, evaluation of, and stereotypes regarding political information [13] than health information, which would be more neutral and of more universal interest.

**Network overlap.** There are many ways to measure the social network status of the author and social relationship with the reader. For example, [39] found that higher in-degree (popularity) authors received higher interestingness evaluations. We chose a measure of closeness between the stimuli authors and the study participants (the number of

your friends who are following the author) to capture the social influence from one's direct social network in a credibility judgment. This measure was manipulated with two conditions: *Overlap*, in which the study participant was told a random number between two and five of her friends were following the content author (the random variation was used to make the deception more plausible), and *no overlap*, in which case no connection between the author and participant was indicated (see Figure 1).

**H5:** People will find tweets from authors who their friends also follow more credible. Survey participants in [34] reported having greater trust in tweets from people they followed, leading us to surmise that tweets from second-degree network connections may be perceived as more credible than those from unconnected users.

**H5a:** This effect will be more pronounced in China than in the U.S. because participants' perceptions might be more affected by other people, given the collectivist culture where people are highly connected and social relationships are stronger and more influential [17, 18].

**H6:** Overall, Chinese users will find microblog updates more credible than U.S. users, since government censorship of traditional media in China and a collectivist culture that places high value on social relationships may improve users' valuation of peer-produced content. [61] reported that Chinese users rely more on SNS in information seeking than the U.S. users.

### Study Design

In order to test the above hypotheses we designed a within subjects experiment [gender × user name × profile image × location × network overlap]. To limit the experiment to a reasonable length, we simplified each factor to two conditions, as described above [ $2 \times 2 \times 2 \times 2 \times 2 = 32$  combinations].

We made culture a between-subjects factor, such that participants were in either a China or U.S. condition, seeing stimuli tailored to their culture (described below). Finally, participants were randomly assigned to either a politics or health topical condition, such that they only saw content on one of those topics. The topic condition was included for generalizability and because we felt political topics may show distinct effects in China (see above hypotheses) but kept between subjects in order to maintain a reasonable time frame for each experimental session.

### Tweet content

In order to have tweet content for participants to rate, we authored sets of 32 original tweets for the four (topic × culture) between-subjects conditions (128 total tweets). The 64 tweets in the Chinese culture condition were written in Chinese characters by a native Chinese speaker, while those in the U.S. condition were written by a native English speaker. Similar to [34], these tweets used standard grammar and spelling to remove the influence of message style on credibility perceptions. Since Chinese tweets can

contain significantly more information with the same character limit, we controlled the length of Chinese tweets based on a similar amount of information that can be conveyed in a 140-character English tweet. Each tweet described a topically-relevant current event, followed by a shortened URL (using the different shortening conventions common in the U.S. and China).

We wanted the tweets to be as relevant to participants as possible. Therefore, all tweets in the politics topic condition were only about local events within each country. However, Chinese tweets in health were translated from English tweets, as they all describe generally relevant health topics.

Importantly, the stimuli messages were false, designed to describe events that had never taken place, but which were plausible. To ensure all messages had a similar level of plausibility, we pilot-tested them on a group of native speakers in our organization and iteratively revised and verified that the messages all fell into a small range of a plausibility assessment scale. Prior work [34] found that users were unable to accurately distinguish true tweets from false ones designed in this manner. The falsehood of the stimuli messages, randomly combined with different profile conditions, allowed us to best isolate the effect of the factors of interest (location of the author, network overlap with the participant, etc.) on credibility assessments in each culture.

The messages, in combination with the aforementioned profile features, were rendered using a .css style similar to that of Twitter.com (and also the Chinese Sina-Weibo). One important modification was the addition of the location



**Figure 1. Four sample tweets from our experiment with different condition combinations:**

- (A) female×topical\_ID×anonymous\_image×liberal\_location×no\_overlap×health×U.S.
- (B) female×internet\_ID×photo image× conservative\_location ×overlap×politics×U.S.
- (C) male×internet\_ID×anonymous\_image×liberal\_location×no\_overlap×health×China
- (D) male×topical\_ID×photo\_image× conservative\_location× overlap×politics×China

feature and (in the *overlap* condition) the network overlap feature, which were rendered underneath the message using the position and styling that Twitter typically uses for timestamps (which were not included in our rendering). All 32 conditions for the profile features were combined for each of the four between-subjects conditions, and generated into images that were rated by the participants in our experiment (Figure 1). A sufficiently-sized set of photos, user names, locations, and tweets was generated such that no component was repeated.

### EXPERIMENT AND SURVEY

We built an online experiment site to implement this study. Participants from the two countries were directed to the corresponding version of the website (in either English or Chinese), and randomly assigned into either of the two topical conditions (health or politics). Users were prompted to provide their Twitter or Weibo user name, so that they would assume that our experimental software had crawled their network in order to compute the network overlap features (although this feature was in fact randomly generated). After the experiment and survey was complete, participants read a debriefing message explaining that the message content and network overlap information had been falsified for the purposes of the study.

The set of 32 tweets for the appropriate culture×topic condition were displayed one at a time, in a random order. Participants were asked to rate how much they agreed that the microblog update contained credible information, using a 7-point Likert scale. For each rating task, the participants were instructed to not leave the page or perform additional Web searches (the updates themselves were rendered as images rather than as HTML, so that the URLs contained were not clickable). After completing the 32 rating tasks, participants were asked to take a survey that collected their demographic data and data on their use of microblog services.

Since our main goal was to extract cultural differences in the mechanism of perceiving microblog credibility, we confined our study in the two countries to comparable user samples: participants were recruited from a global software company with offices in both the U.S. and China. Although these participants do not necessarily reflect a representative sample of a country’s general population, they do represent user groups with similar job type, educational background, socioeconomic status, and technology access between the two countries. This helps us attribute our findings more confidently to cultural, rather than educational or socio-economic, differences. But we also should note that for some microblog-usage results, technologically savvy people tend to be early adopters and their behavior may be leading the trend of the following few years.

We invited participants via email (randomly selecting from the company email lists in the two countries). The invitation email indicated that a precondition to be eligible for the study was to be a microblog user and read microblog

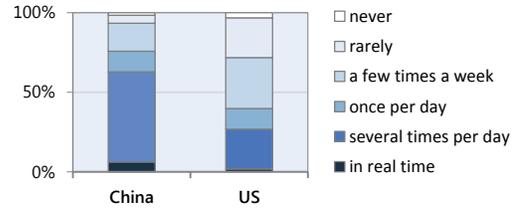


Figure 2. Frequency of reading microblogs in each culture.

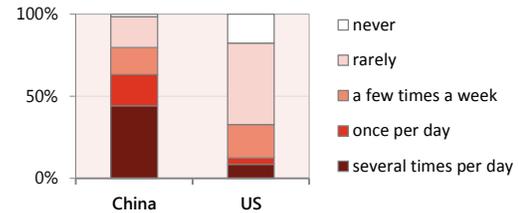


Figure 3. Frequency of posting to microblogs in each culture.

updates occasionally (microblog usage was re-verified with survey questions). As an incentive to participate, participants were entered into a drawing for an online gift-certificate from a shopping site in their country.

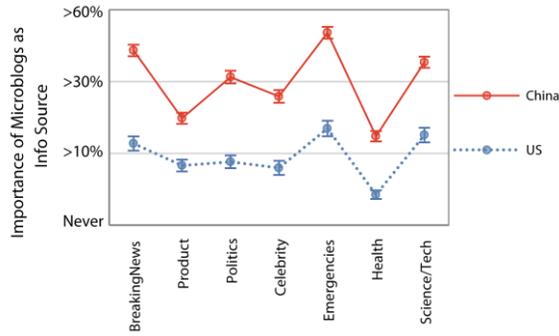
### Participants

The online study was conducted during March 2012. In total, 3000 invitation emails were sent and 256 Chinese and 153 U.S. respondents completed the study. Due to the technical nature of this company, there were more males (320) than females (89) overall, though the gender ratios were similar (CN: 75%, U.S.: 83%) between the two cultural groups. In terms of age distribution, the two groups had similar ratios for the 18-24 range (CN: 5.1%~U.S.: 5.9%) and 35-44 (CN: 33.3%~U.S.: 37.9%). However, the Chinese group had more people in the 25-34 range (60.4%, compared to U.S. 35.9%); while the U.S. group had more in the 45-54 range (18.3%, compared to CN 1.2%). We incorporated these major demographic variables into our analysis as controls (see Table 1).

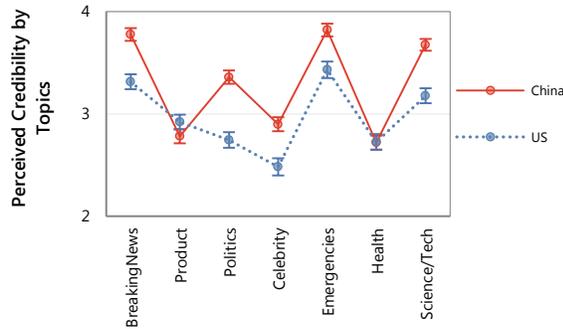
### SURVEY RESULTS

The survey revealed that cultural differences significantly impact microblog usage and credibility perceptions. First, consistent with findings in [61], Chinese users appeared to be more engaged in microblogs in terms of both sharing and consuming information (Figure 2-3: Chinese respondents reported higher frequencies of reading and posting tweets). This stronger preference for microblogs might be a combined result from two factors: 1) with a collectivist cultural orientation, Chinese people may prefer more social types of media to serve their informational and social needs; and 2) the information control and centralization due to government censorship can significantly limit people’s exposure to rapidly updated, diverse, and sensitive information, prompting use of peer-produced media.

In fact, Chinese respondents rated microblogs with much higher importance scores as an information source, measured by the percentage of everyday information obtained from microblogs on different topics (from 1: never



**Figure 4. Mean reported importance of microblogs as an information source for several news topics.**



**Figure 5. Mean reported perceptions of microblog information credibility on several topics (five-point scale).**

to 5: >90%). As shown in Figure 4, mean values for Chinese respondents ranged around 3 across topics, which suggests that on average they use microblogs as a source of almost 50% of their information. Comparatively, U.S. respondents reported that they obtained less than 25% of their information from microblogs ( $p$  in t-test on each topic < .001).

The Chinese users' preference for microblogs is also reflected in their consideration of credibility (measured by a 5-level Likert scale from 1-point: "not credible at all" to 5-point: "tweets are all of very high credibility"). As Figure 5 indicates, except for *Products* and *Health* that were similar across countries, Chinese respondents consider information from microblogs to be more credible than U.S. respondents ( $p < .001$ ). It is not clear whether this difference is due to inherent differences in the credibility quality of microblog information in the two cultural contexts, or to the different ways people perceive the credibility of microblog information and/or other information sources. However, this does reveal the substantial difference in the attitude toward and use of microblogs across these two cultures.

## EXPERIMENTAL RESULTS

In total, 409 respondents completed our online experiment and each of them rated 32 tweets in one of the four topic×cultural contexts. This generated 13,954 tweet ratings. As described in the "Hypotheses" section, we tested each of the hypothesized factors (including interactions) in predicting the final rating for a tweet's credibility.

Predictor factors	F value	df	Pr(>F)
Culture	385.845	1	.000
Topic	82.397	1	.000
Gender	14.542	1	.000
User name	27.856	1	.000
Profile image	22.916	1	.000
Location	32.107	1	.000
Network overlap	50.122	1	.000
Culture * Topic	200.780	1	.000
Culture * Gender	.506	1	.477
Culture * User name	60.786	1	.000
Culture * Profile image	4.926	1	.027
Culture * Location	8.279	1	.004
Culture * Overlap	2.888	1	.089
Topic * Gender	4.664	1	.031
Topic * Profile image	.153	1	.695
Topic * User name	15.223	1	.000
Topic * Location	22.503	1	.000
Topic * Overlap	28.690	1	.000
Culture * Topic * Gender	8.439	1	.004
Culture * Topic * User name	21.052	1	.000
Culture * Topic * Profile image	1.883	1	.170
Culture * Topic * Location	6.116	1	.013
Culture * Topic * Overlap	5.644	1	.018
Controlled variable: Reader's Age	13.797	4	.000
Controlled variable: Reader's Gender	4.142	1	.042
Controlled variable: Reader's job role	22.637	9	.000

**Table 1. Impact of microblog factors on credibility**

We applied mixed-design ANOVA to test the effect of all the predictor factors (segregating within- and between-subjects factors) and their interactions on credibility ratings. Table 1 lists the test results with all hypothesized factors and controlled demographic variables of age, gender, and job role (note: more complicated interaction terms might be significant but adding those into the model did not significantly alter the results in the current table). In the remainder of this section, we present the test results for each hypothesized factor and we report the significance from the ANOVA model (additionally, we check the directions of the differences to verify the hypotheses). Note that for main effects we report means in the text, while for interaction effects for readability we report p-values only and refer the reader to the figures to see means.

### Gender

**H1: (Supported)** People find tweets from men ( $M_{\text{male}} = 3.87$ ) more credible than those from women ( $M_{\text{female}} = 3.75$ ,  $p < .001$ ).

**H1a: (Not supported)** The interaction between gender and cultural context is not significant ( $p = 0.477$ ).

**H1b: (Supported)** The gender difference is more salient in political tweets, with tweets from male authors rated as more credible ( $p < .05$ , Figure 6).

The non-significance of the interaction term (H1a) between gender difference and culture inspired us to explore this issue further, looking at the three-way interaction of these two factors with topical context. The result indicates that

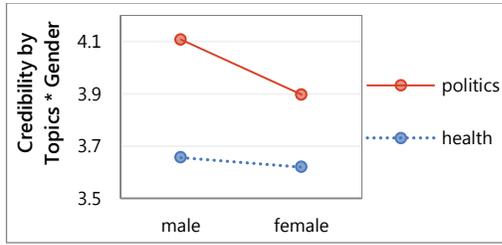


Figure 6. Interaction of gender\*topic

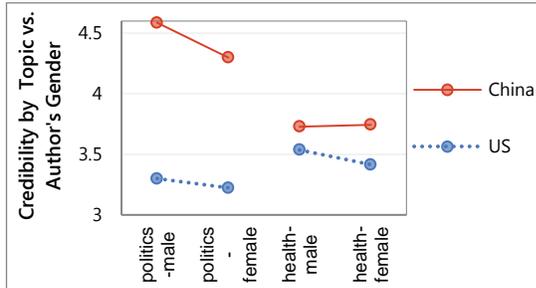


Figure 7. Interaction of gender\*topic\*culture

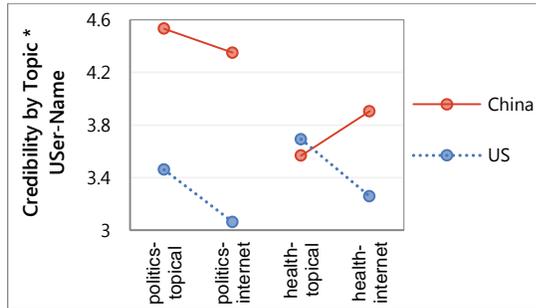


Figure 8. Interaction of user name\*topic\*culture

gender matters differently in the two cultures, depending on the topical domain ( $p < 0.005$ ). As shown in Figure 7, Chinese respondents present stronger gender difference on the politics topic, while for the U.S. respondents the differences appear to be consistent across topics.

This favor to males' tweets is also consistent between the respondents' genders. However, we found that in the U.S. condition, female respondents tend to systematically rate all tweets as less credible than males ( $p < 0.001$ ).

### User Name

**H2: (Supported)** People find tweets from users with topical user names ( $M_{\text{topical}} = 3.86$ ) more credible than those with Internet-style user names ( $M_{\text{internet}} = 3.76$ ,  $p < .001$ ).

However, the interaction between user name and culture is complex, due to an additional interaction with topic ( $p < .001$ , Figure 8). The differences in credibility based on user name styles are fairly consistent for the U.S. respondents, with internet style names viewed as less credible (replicating Morris et al.'s finding [34]). Interestingly, Chinese respondents present opposite patterns across topics: consistently they find tweets with topical-style user names

more credible than those with Internet-style user names for the political topic, while they find tweets with topical-style user names less credible for the health topic.

A possible explanation may be that Chinese respondents believe that health tweets with internet-style user names have been authored by everyday individuals, who themselves believed the news to be credible. In contrast, users with topical user names are possibly sources of spurious health tweets, for promoting products, spamming, or other purposes. For political tweets, topical user names may imply that the author is closer to political information sources, which often are inaccessible to normal individuals in China.

### Profile Image

**H3: (Supported)** Consistent with [34], people find tweets using photos for the profile image ( $M_{\text{photo}} = 3.88$ ) more credible than those using generic images ( $M_{\text{anon}} = 3.74$ ,  $p < .001$ ).

**H3a: (Supported)** There is significant interaction between profile image and culture ( $p < .05$ ) as predicted, Chinese respondents are less sensitive to using anonymized images (Figure 9).

### Location

**H4: (Supported)** People find tweets from people in more liberal locations ( $M_{\text{liberal}} = 3.92$ ) to be more credible than tweets from people in more conservative locations ( $M_{\text{conservative}} = 3.71$ ,  $p < .001$ ).

Since our sample tends to be biased to people from liberal regions (>89%) and they might believe information from those who are more similar to them, we coded the U.S. respondents based on the liberal-conservative schema. These two types of respondents similarly rated tweets from liberal locations as more credible. Overall, respondents from conservative regions tend to rate all tweets as more credible than participants from liberal regions (t-test:  $p < .001$ ). We were unable to perform this analysis for Chinese respondents because they were all from liberal regions.

**H4a: (Supported)** The interaction between location difference and cultural context is significant ( $p < .005$ ). As predicted, the location effect is more salient in China, where tweets from people in more liberal locations tend to

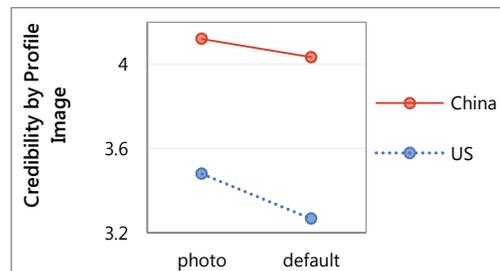


Figure 9. Interaction of profile image\*culture

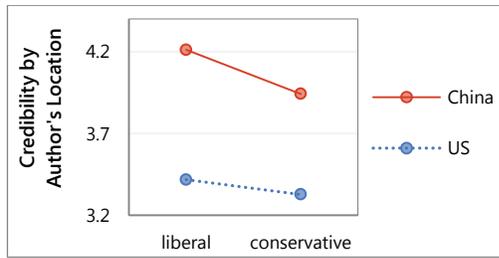


Figure 10. Interaction of location\*culture

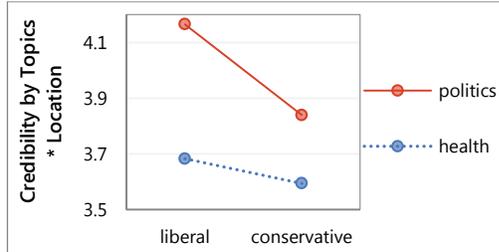


Figure 11. Interaction of location\*topic

be perceived as even more credible (Figure 10).

**H4b: (Supported)** The interaction between location difference and topical context appears to be even more significant ( $p < .001$ ). As predicted, the tweet credibility difference between liberal and conservative locations is more prominent for political tweets (Figure 11).

#### Network Overlap

**H5: (Supported)** People find tweets from authors who their friends also follow ( $M_{\text{overlap}} = 3.92$ ) more credible, and tweets from authors who have no social connections with them ( $M_{\text{none}} = 3.71$ ,  $p < .001$ ) less credible.

**H5a: (Not supported)** The interaction between network overlap and cultural context is not significant ( $p = .089$ ).

However, our exploratory test on the three-way interaction between network overlap with the two topical domain factors indicates insightful results ( $p < .05$ , Figure 12): U.S. respondents present fairly consistent difference patterns between the two overlap conditions, while for Chinese respondents, they believe political tweets from outside their closer social network as more credible. This again reminds us of the special credibility and accessibility status of political information in China. Note also that political tweets were rated as highly credibly by Chinese users regardless of network overlap. Taken together, these findings suggest that Chinese users are likely to view social media as a reliable information source for politics, potentially in contrast to state-controlled media and other more easily censored information sources, but that they also know that their own social network is unlikely to have access to authentic and reliable political information.

#### General Cultural Attitudes

**H6: (Supported)** Chinese users overall view microblogs as a more credible source of information than U.S. users. Our

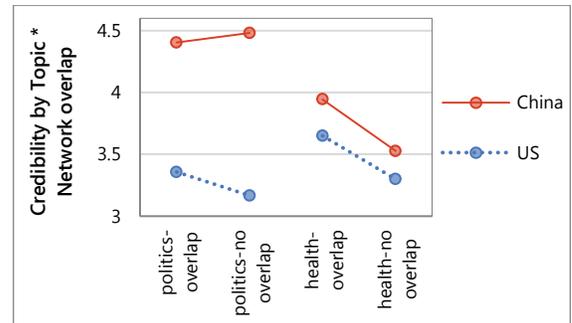


Figure 12. Interaction of overlap\*topic\*culture

survey findings (reported in the previous section), indicated that Chinese users viewed microblogs as equally or significantly more credible than U.S. users for a large selection of topics. In our experiment, Chinese users rated tweets as significantly more credible overall (comparing health tweets because the contents were matched across languages:  $\text{mean}_{\text{china}} = 3.75$ ,  $\text{mean}_{\text{US}} = 3.48$ ,  $p < 10^{-9}$ ).

One limitation in the credibility ratings is that some of the difference may be caused by systematic differences in using the scale between U.S. and China-based participants. However, we see support for H6 from multiple sources: the consistency between survey answers and experimental ratings, and the correlation between the Chinese respondents' higher credibility evaluations and their more frequent usage of microblogs and heavier reliance on microblogs as an information resource. In addition, this result is consistent with the finding in [61] that Chinese users rely more on SNS in information seeking than the U.S. users.

#### Synthesizing the Tests

The ANOVA test results in Table 1 present an overview of all single and interaction predictors, from which we can extract the relative significance among different factors. First, the *Culture* and *Topic* factors yield the largest differences in terms of affecting credibility judgment. In particular, consistent with the finding in [61] in which culture accounts for the most variance in predicting people's social querying behavior, here culture appears to be a dominant influence on social media credibility perceptions. The five profile features are also very important predictors. In particular, variations on the location and overlap factors are associated with highly significant changes in credibility assessments.

A prominent pattern in our test is that the interactions among these profile and cultural factors pervasively and significantly exist in multiple levels. Particularly, Chinese respondents' behavior tends to be more complex and unpredictable: they often vary their credibility assessments according to different combinations of conditions, and even present opposite patterns due to changes in the factors tested. For instance, the effect of network overlap was dependent on the topic for the Chinese respondents.

## DISCUSSION

Our experiment showed how culture interacts with microblog profile features (gender, user name, profile image, location, and network overlap) and topical context to affect content credibility assessments. These interactions reveal a complex and context-dependent mechanism for microblog credibility perceptions, particularly among Chinese users, suggesting caution in interpreting and designing based on effects of single factors. Credibility ranking algorithms should incorporate interactions among factors. When representing microblog information, such as in search results, the relative importance among different features might vary by context. For example, the location information about the tweet author should be more important and salient for a search in political news, while other features may need to be moved down or off due to limited space.

Our experiment found that two factors, location and network overlap, although often neglected in tweet representation (for example, these are not shown in the default view of updates on Twitter.com), actually account for more influence in credibility assessments than the other profile factors studied. Even if a user might not reveal her/his actual location information, it is relatively easy to approximate through minimal tweet content analysis [20], and could be displayed or used to filter or rank microblog search results. Location information together with various social structural features, such as network overlap and social distance, can be generated at relatively low cost, but may yield great utility in discovering credible information.

We have for the first time examined cultural differences in the credibility perceptions of social media information. These cultural differences that are embedded in how people process information and conduct social interactions, interacting with other cultural factors such as the social and technology status of the country, generated significant differences in credibility perceptions in the social information networks studied. In fact, culture appears more influential than the properties of the tweet itself. Chinese respondents were more sensitive to context, changing their judgements based on small variations of the conditions. For instance, while U.S. respondents showed the same effect for username type across topics, Chinese users showed opposite effects depending on whether the content was political or health related (Figure 8). This implies a new form of software “localization”, as direct transfer of content ranking algorithms for social media across cultures is suboptimal. In this case, Chinese people’s more context-dependent perceptions may require that algorithms incorporate additional content and social dimensions. For the user experience, Chinese users are likely to utilize (with or without explicit conscious awareness) additional metadata when evaluating microblog content. Thus, for search or other alternative microblog interfaces, simply extracting part of the user profile along with the tweet may fail to support user confidence in the credibility of the

message content sufficiently. For highly context-sensitive cultures like China, providing additional metadata will better align with how such users evaluate social media-authored information.

The importance of tailoring metadata presentation to specific cultures is reflected in the survey and experiment results that showed that Chinese users believe microblogs to be more credible and that they rely on this information source more than U.S. users. Note that our study does not investigate whether this trust is warranted (although the fact that Chinese users gave high credibility ratings to the tweets, even though they were all false, indicates that this group may be placing too much confidence in the authenticity of social media). This preference may be related to their social-oriented information consumption behavior, the information deficiency from other sources due to censorship, or current design (culturally localized) and status of microblog services in China.

Current Chinese microblog services do provide some of this additional metadata (e.g., on Sina Weibo, a rough sense of the network overlap with the author is presented to the reader) though most have yet to be included. Similarly, some of the interface features on Chinese microblog sites, such as retweet chains linking back to the original source, representing a whole sequence of social filtering actions, might aid U.S. (and other) microblog consumers in making accurate assessments of credibility. Closer examination of leveraging these interface cues in non-Chinese microblog environments is an exciting opportunity for future work.

Finally, although with relatively smaller effect, credibility perceptions can vary by demographic factors such as age and gender. Our explorations also found people from liberal regions tend to systematically view tweets as less credible. Thus it is important to investigate different user groups in addition to cultural factors, and design user experiences with user-group-oriented customizations. We are interested in exploring this in our future work.

## CONCLUSION

As microblogs become an increasingly important news source in both the U.S. and China, understanding how to help users discern the quality of microblog information takes on increased importance. In this paper, we presented the first investigation of cultural differences in the perception of microblog credibility between the U.S. and China. We provided survey and experimental results illustrating the impact that an author’s gender, profile image, user name, location, network overlap with the end user, and message topic have on credibility perceptions, and find key differences between the two countries. Chinese users show relatively high trust in and dependence on microblogs as an information source, greater acceptance of anonymously and pseudonymously authored content, and they tend to more depend on and integrate multiple metadata when evaluating microblog credibility. We hope that our reflections on the implications of these findings

assist designers of search engines and other tools for aggregating microblog content in better conveying credibility to end-users within and across cultures.

#### ACKNOWLEDGMENTS

We would like to thank Brent Hecht, Xiang Cao, and Darren Edge for their help. This work was partly funded by NSF IIS-0948639.

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