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Disentangling Stereotypes From Social Reality: Astrological Stereotypes and Discrimination in China

Jackson G. Lu
Massachusetts Institute of Technology

Xin Lucy Liu
Peking University

Hui Liao
University of Maryland, College Park

Lei Wang
Peking University

Because stereotypes and social reality are mutually reinforcing, it is often unclear whether a given stereotype has emerged from preexisting social reality, or has shaped social reality over time to resemble the stereotype (e.g., via discrimination). To address this chicken-or-egg problem, we advance an integrative model that captures not only endogenous stereotype formation from social reality, but also exogenous stereotype formation without social reality. When arbitrary social categories are introduced, the cultural meanings of category cues (e.g., semantic category names) can be exogenously projected as stereotypes onto those social categories. To illustrate exogenous stereotype formation, we examined a novel form of stereotyping and discrimination in China based on astrological signs, which were introduced into China from the West. Studies 1a, 1b, and 2 revealed that astrological stereotypes are salient in China (but not in the United States). These stereotypes were likely produced exogenously because of how the signs were translated into Chinese. In particular, Virgos are stereotyped as having disagreeable personalities, likely because of Virgo's Chinese translation as "virgin" (Study 3). This translation-based stereotype led Chinese individuals to discriminate against Virgos in romantic dating (Study 4) and in simulated job recruitment (Studies 5 and 6). Studies 7 and 8 confirmed that astrological stereotypes are inaccurate and astrological discrimination is irrational: Astrological sign predicted neither personality (N = 173,709) nor job performance (N = 32,878). Overall, our research disentangles stereotypes from social reality by providing a real-world demonstration that stereotypes can form without preexisting social reality, yet still produce discrimination that can then shape social reality.

Keywords: culture, globalization, stereotype, discrimination, personality

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Which comes first, stereotypes or social reality? In the literature, *stereotypes* refer to what social groups are perceived to be like, while *social reality* refers to what social groups are really like (Jussim, 2012; Oakes, Haslam, & Turner, 1994). Because stereotypes and social reality are mutually reinforcing, it is often unclear whether a given stereotype has emerged from preexisting social reality, or instead has shaped social reality over time to resemble the stereotype (e.g., via discrimination). This chicken-or-egg problem has long intrigued and befuddled social scientists (Jussim, 2012, 2017; Oakes et al., 1994; Tappin, McKay, & Abrams, 2017).

To help disentangle stereotypes from social reality, we capitalize on a novel form of stereotyping and discrimination in China, one based on Western astrological signs. Through globalization, these astrological signs were introduced into China and translated into the Chinese language. Western astrology asserts that the astrological sign under which an individual was born influences

Jackson G. Lu, Sloan School of Management, Massachusetts Institute of Technology; Xin Lucy Liu, Guanghua School of Management, Peking University; Hui Liao, Robert H. Smith School of Business, University of Maryland, College Park; Lei Wang, School of Psychological and Cognitive Sciences, Peking University.

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Correspondence concerning this article should be addressed to Jackson G. Lu, Sloan School of Management, Massachusetts Institute of Technology, 100 Main Street, Cambridge, Massachusetts 02142. E-mail: lu18@mit.edu

his or her personality (Carlson, 1985). Although astrology "remains a largely niche interest in the West," it "has in recent years become a mainstream cultural trend in China" (*The New York Times*, 2017). For example, major Chinese websites such as Sina, Sohu, and Tencent all feature astrology as a prominent section on their homepages. In 2013, "astrological sign" was the fifth most popular mobile search term on Baidu, the largest search engine in China (*The New Republic*, 2014). Anecdotally, in China there are personality stereotypes associated with the astrological signs (henceforth "astrological stereotypes"), such that some Chinese use astrological signs to infer personality traits and make decisions in everyday life. In particular, some people intentionally avoid Virgos (those born between August 23 and September 22) as friends, romantic partners, or employees, purportedly because Virgos (literally translated as "virgin" in Chinese) are stereotyped as having disagreeable personalities (e.g., critical, fussy, picky, obsessive-compulsive, germophobic; *Business Insider*, 2014). For example, some Chinese job postings proclaim that Virgo candidates are not wanted (*The Telegraph*, 2011). In fact, Virgo "has become so tarnished that some Chinese employers go out of their way to emphasize in job postings that, yes, Virgos are welcome to apply, too" (*The New York Times*, 2017). Taking such anecdotal evidence as a point of departure, the present research systematically investigated astrological stereotyping and discrimination as new cultural phenomena in China.

As we elaborate below, astrological stereotypes represent a theoretically and empirically novel form of stereotype. Past research has largely assumed that stereotypes emerge endogenously from perceived social reality—that is, based on the perception of what social groups are really like (Brown & Turner, 2002; Ford & Stangor, 1992). By contrast, the current research suggests that astrological stereotypes were *exogenously* imposed onto the 12 astrological signs as a result of how they were translated into Chinese. Because these astrological stereotypes were not based on any preexisting social reality to begin with, they enable us to address the question of whether stereotypes *per se* can shape social reality. By spotlighting astrological stereotypes and discrimination in China, we provide a real-world demonstration that stereotypes can form without preexisting social reality, yet still produce discrimination that can then shape social reality.

In the following theory section, we first review how past theories have mostly focused on stereotype formation as an endogenous process based on perceived social reality. We then identify an *exogenous* process of stereotype formation independent of social reality. Specifically, we propose that arbitrary social categorization can exogenously produce groundless stereotypes when the social categories contain cues (e.g., semantic category names) that have shared cultural meanings. Further, we theorize how such exogenously formed stereotypes can help disentangle stereotypes from social reality, thereby addressing the chicken-or-egg problem. Finally, we summarize our theoretical perspective by advancing an integrative model of stereotypes and social reality (see Figure 1).

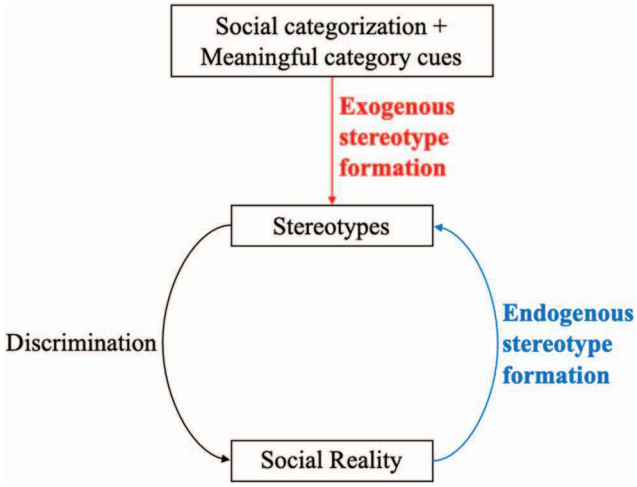

Figure 1. An integrative model of stereotypes and social reality. (1) In the literature, *stereotypes* refer to what social categories are perceived to be like, while *social reality* refers to what social categories are really like (Jussim, 2012; Oakes et al., 1994). (2) We note that, in addition to discrimination, there are other channels through which stereotypes may shape social reality (e.g., preferential treatment, self-fulfilling prophecy, and stereotype threat). See the online article for the color version of this figure.

Stereotype Formation From Social Reality

A wealth of research has studied the formation of stereotypes (Hilton & von Hippel, 1996; Kende & McGarty, 2019; Mackie, Hamilton, Susskind, & Rosselli, 1996; McGarty, Yzerbyt, & Spears, 2002). Past theories have largely conceptualized stereotypes as emerging endogenously from perceived social reality. These theories "suggest that to some extent stereotype content is based upon direct observation and experience with group members" (Brown & Turner, 2002, p. 70), whether such observation and experience are accurate or shaped by cognitive and motivational biases.

Some scholars argue that stereotypes form as *accurate* reflections of social reality (Ford & Stangor, 1992; Jussim, 2017; Jussim, Crawford, & Rubinstein, 2015; Koenig & Eagly, 2014). Ford and Stangor (1992) proposed that perceivers direct attention to the characteristics differentiating groups from one another, and form accurate associations between these characteristics and groups. Along similar lines, Oakes et al. (1994) asserted that "stereotyping is psychologically rational, valid and reasonable, that it provides veridical social perception (i.e., it reflects reality accurately)" (p. 187). In fact, Jussim and colleagues (2015) concluded that "stereotype accuracy is one of the largest and most replicable findings in social psychology" (p. 490). For example, the stereotype that Asians perform well in math is statistically accurate on average (*The Economist*, 2015). Thus, without individuating information, discrimination based on stereotypes may be considered "rational"—an idea captured by the concept of statistical discrimination in economics and sociology (Fernandez & Greenberg, 2013; Phelps, 1972).

Meanwhile, other scholars argue that stereotypes form as *inaccurate* reflections of social reality because of cognitive and motivational biases (Hamilton & Gifford, 1976; Sherman et al., 2009; Tajfel & Wilkes, 1963). Among *cognitive* biases in stereotype formation, illusory correlation has received much scholarly attention (Hamilton & Gifford, 1976). Because unfamiliar behaviors are numerically rare, when they are performed by minority group members (who by definition are also numerically rare), people

tend to form the illusory perception that minority group members are disproportionately responsible for unfamiliar behaviors. For example, when American individuals see that a Nepali owns a pet beaver (i.e., a rare behavior performed by a minority group member), they may be prone to form the inaccurate stereotype that Nepalis like pet beavers (Risen, Gilovich, & Dunning, 2007). In other words, "rare or infrequent behaviors performed by a minority would be doubly distinctive and would have a disproportionately large effect on the stereotype because they would be overrepresented in memory" (McGarty, 1999, p. 84).

In addition to cognitive biases, various theories have also examined *motivational* biases in stereotype formation. System justification theory (Jost & Banaji, 1994) posits that people are motivated to perceive the status quo as fair and legitimate. As Kay and colleagues (2009) noted: "the motivation to view what is as what should be may lead to the creation of stereotypes that, in effect, legitimize reality, however unfair reality may be" (p. 431). For instance, the stereotype that Blacks are less competent, intelligent, and hardworking than Whites was posited to have emerged partly as an ideological justification for the socioeconomic gap between the two groups (Jost, 2001). Relatedly, the Stereotype Content Model argues that "stereotypes result from the social structural relations between groups" (Fiske, Cuddy, Glick, & Xu, 2002, p. 881). The perceived status of a group positively predicts its perceived competence, while the perceived competition with a group negatively predicts its perceived warmth (Durante et al., 2017; Fiske et al., 2002; cf. Koch, Imhoff, Dotsch, Unkelbach, & Alves, 2016). For example, Jews are stereotyped as not only competent, but also cold because of the perception that they pose a competitive threat (Fiske et al., 2002). People are motivated to form such ambivalent stereotypes because these stereotypes elicit less psychological discomfort than uniformly negative or positive stereotypes (e.g., other ethnic groups might feel inferior if Jews were stereotyped as both competent and warm).

Although the above accounts of stereotype formation differ in theoretical focus, they all "agree that stereotypes are initially based upon the *perception* of differences between groups, even though this perception may not always reflect *real* differences" (Brown & Turner, 2002, p. 69; italics in original).

The Chicken-or-Egg Problem of Stereotypes and Social Reality

As reviewed above, much research has examined how stereotypes form endogenously from perceived social reality (Brown & Turner, 2002). However, what remains elusive is whether it is possible for stereotypes to form without preexisting social reality and then produce social reality. The mutually reinforcing nature of stereotypes and social reality creates a chicken-or-egg problem: It is often unclear whether a given stereotype has emerged from preexisting social reality, or instead has shaped social reality over time to resemble the stereotype. For example, consider (a) the stereotype that women are less interested in STEM (science, technology, engineering, and math) and (b) the social reality that on average women self-report being less interested in STEM (Su, Rounds, & Armstrong, 2009; Wallen, Morris, Devine, & Lu, 2017). On the one hand, it is possible that this stereotype is a reflection of intrinsic gender differences in STEM interest. On the other hand, it is also possible that this stereotype was inaccurate at its origin, but *became* accurate over time because of gender discrimination that limited women's opportunities in STEM (Cheryan, Ziegler, Montoya, & Jiang, 2017). Thus, it is ambiguous whether this stereotype of gender differences in STEM interest was accurate *at its origin*. It is particularly difficult to disentangle stereotypes from social reality because most well-studied stereotypes (e.g., race, gender) have existed for long periods of time, allowing stereotypes and social reality to reinforce each other (North & Fiske, 2014).

Disentangling Stereotypes From Social Reality

To disentangle stereotypes from social reality, it is constructive to examine whether stereotypes can form without preexisting social reality, yet still produce discrimination that then shapes social reality.

Therefore, the first piece of the chicken-or-egg puzzle is: Can stereotypes form without preexisting social reality? Extending the predominant view of stereotype formation as an endogenous process (as reviewed above), we identify an exogenous process of stereotype formation. We posit that stereotypes not only can be distilled from social reality endogenously, but also can be imposed onto social categories exogenously. As theorized below, when arbitrary social categories (devoid of social reality) are introduced, the cultural meanings of category cues (e.g., category names) can be exogenously projected as stereotypes onto those social categories. Thus, whereas endogenous stereotypes are (accurate or biased) reflections of social reality (Brown & Turner, 2002), exogenous stereotypes are not reflections of social reality at all. Contrary to the common belief that stereotypes contain "a kernel of truth" (Allport, 1954), the discovery of exogenous stereotypes would suggest that stereotypes can form without any kernel of truth.

How Arbitrary Social Categorization Produces Groundless Stereotypes

Past research has examined the power of arbitrary social categorization in intergroup processes (McGarty, 1999; Tajfel, Billig, Bundy, & Flament, 1971). The influential Minimal Group Paradigm (Brewer, 1979; Locksley, Ortiz, & Hepburn, 1980) demonstrates that social categorization *per se* is sufficient to produce intergroup biases. In the paradigm, subjects who are randomly assigned to arbitrary social groups tend to favor ingroup members relative to outgroup members (e.g., by allocating more resources to ingroup members). This effect occurs even when there is no face-to-face interaction, utilitarian self-interest, or history of relationships (for a review, see Otten, 2016).

Nevertheless, the Minimal Group Paradigm is inadequate for understanding whether and how arbitrary social categorization can produce stereotypes in society. First, the Minimal Group Paradigm is about *individuals'* biases toward ingroup versus outgroup members, whereas stereotypes are socially shared beliefs about a group at the *societal* level (Lyons & Kashima, 2001; Turner, Oakes, Haslam, & McGarty, 1994). Second, as an artificial, temporary paradigm based in the lab, the Minimal Group Paradigm does not capture the process of stereotype formation in the real world. Third, although the Minimal Group Paradigm demonstrates how arbitrary social categorization can produce *general* ingroup versus

outgroup biases, it does not explain how arbitrary social categorization can produce *particular* stereotypes about *particular* groups. That is, the paradigm does not explain specific stereotype contents (e.g., Virgos are fussy), as "minimal in-groups are defined by *valence* (e.g., in-group favoritism)—an overall positive value connotation" (Otten & Moskowitz, 2000, p. 80; italics in original).

Building on the Minimal Group Paradigm, we propose that arbitrary social categorization can produce groundless stereotypes when the social categories happen to contain cues that have shared cultural meanings. That is, arbitrary social categorization *plus* culturally meaningful category cues can produce groundless stereotypes. When new social categories are introduced, people are apt to seek intercategory differences so as to conserve cognitive resources in a complex social world (Macrae, Milne, & Bodenhausen, 1994). However, unlike social categories that are based upon perceived intercategory differences in social reality, arbitrary social categories by definition have no basis in social reality. Thus, people are prone to resort to culturally meaningful category cues such as category name, symbol, color, and so forth (Fiske & Neuberg, 1990).[1] According to distributed connectionist models (Humphreys & Kashima, 2002; Kashima & Kerekes, 1994), cultural meaning is "represented within each person's mind in a distributed form" (Kashima, 2014, p. 86). Category cues (e.g., category names) evoke cognitive associations shared within a culture (Holtgraves & Kashima, 2008; Keh, Torelli, Chiu, & Hao, 2016). Independent of social reality, these category cues *per se* can exogenously impose groundless stereotypes onto the social categories through cognitive associations.

We theorize that the contents of such exogenous stereotypes are determined by both *category cues* and *cultural contexts*. That is, arbitrary social categories may have different stereotypes if category cues and cultural contexts vary. First, the contents of groundless stereotypes depend on specific category cues, because different cues of the same social category can evoke different meanings within a given culture. For example, the same social category may have very different stereotypes if given different names (Hall, Phillips, & Townsend, 2015; Rios & Ingraffia, 2016). Second, the contents of groundless stereotypes also depend on the specific cultural context. The same category cue may produce different stereotypes if it has different meanings in other cultures. To illustrate how stereotype contents are exogenously determined by both category cues and cultural contexts, consider the real-world example of the Chinese battery brand "白象" (pronounced as "Bai Xiang"). This brand failed in English-speaking countries partly because its name was semantically translated as "White Elephant," which refers to a sacred animal in Chinese but to a costly yet useless possession in English (He & Xiao, 2003). Not surprisingly, English speakers shared a negative "stereotype" of the battery. Had it been translated differently, perhaps as "Silver Elephant" or phonetically as "Bai Xiang" (a name without shared cultural meanings in English-speaking countries), the battery might have avoided its negative image.

Akin to a natural experiment, the formation of astrological stereotypes in China exemplifies how arbitrary social categories produce groundless stereotypes in society. Western astrological signs were introduced into China and translated into Chinese names largely semantically (rather than phonetically). These semantic translations (i.e., category cues) carry particular cultural meanings shared among the Chinese (Kashima, 2014; Keh et al., 2016). As a result, the cultural meanings of these Chinese names were exogenously projected as stereotypes onto the astrological signs. For example, whereas Taurus simply means "bull" in English, it was translated (seemingly haphazardly) as "*gold* bull" in Chinese. As a result, Taurus individuals are stereotyped in China as not only conscientious and stubborn (corresponding to the cultural meaning of "bull" in China), but also materialistic (corresponding to the cultural meaning of "gold" in China).

How Groundless Stereotypes Shape Social Reality

Having theorized that groundless stereotypes can form without preexisting social reality, we next examine the other piece of the chicken-or-egg puzzle: Can groundless stereotypes shape social reality? Empirical evidence suggests so. For example, birthrate data revealed that Chinese parents are less willing to give birth in the Chinese zodiac years of the Sheep, likely because of the stereotype that individuals born in Sheep years are unlucky (Xu, Shen, & Li, 2020). This stereotype stems from the Chinese folk saying "十羊九不全," which means that nine out of ten people born in Sheep years *are not* lucky (*CNN*, 2015). However, centuries ago the original saying was supposedly "十羊九福全," which means that nine out of ten people born in Sheep years *are* lucky. Yet at some point in history, the character "福" ("luck") was mistakenly replaced by a homophone "弗," which has the same meaning as "不" ("not") in modern Chinese (Lin, 2017). In other words, similar to astrological stereotypes, the groundless stereotype of being unlucky was exogenously imposed onto the Sheep, resulting in significant discrimination. Despite such anecdotal evidence, as we discuss below, it remains unclear whether groundless stereotypes can persist, spread, and cause discrimination.

Can groundless stereotypes persist and spread? Scholars have argued that inaccurate stereotypes tend to dissipate as people accumulate more information and compare the stereotypes against social reality (Jussim, 2012, 2017). If so, how can groundless stereotypes persist and spread at the societal level?

We posit that social communication plays an important role in facilitating the persistence and spread of groundless stereotypes. Groundless stereotypes can persist and spread when they serve two central functions of social communication: social connectivity and informativeness (Kashima, 2008). In terms of *social connectivity*, groundless stereotypes are socially connective if their contents have shared cultural ground (Kashima, Klein, & Clark, 2007). Culturally consistent information is likely to be perceived as more socially connective than culturally inconsistent information. To the extent that a stereotype is consistent with shared cultural meanings, people are more likely to talk about and agree on it in social conversations. For example, if the names of arbitrary social categories have semantic meanings shared within a culture, people are prone to converge on stereotypes associated with these semantic meanings. Moreover, the "saying-is-believing" effect (Higgins & Rholes, 1978) suggests that communicators are more apt to believe a stereotype after discussing it. In terms of *informativeness*, groundless stereotypes are more likely to persist and spread when

[1] Frank and Gilovich (1988) demonstrated that because the color black is associated with evil and death, teams wearing black uniforms were perceived as more aggressive and acted more aggressively than teams wearing non-black uniforms.

their contents are novel and interesting (Clark & Kashima, 2007). In fact, research suggests that false information (e.g., fake news) diffuses "farther, faster, deeper, and more broadly" because it tends to be more novel and interesting than true information (Vosoughi, Roy, & Aral, 2018, p. 1146). In an entertainment-oriented era of social media, the Internet can accelerate the diffusion and consolidation of such interesting but groundless stereotypes.

Astrological stereotypes in China can serve both of these social communication functions. With regard to *social connectivity*, because the semantic meanings of the Chinese translations of the astrological signs are culturally shared, Chinese people are prone to converge on these astrological stereotypes. For example, since it is culturally shared in China that gold relates to money and bulls are conscientious and stubborn, the stereotype that Taurus individuals ("gold bull") are materialistic, conscientious, and stubborn is intuitive to Chinese people. In the same way that people chat about the weather as a social lubricant, some Chinese may enjoy chatting about and agreeing on such astrological stereotypes. With regard to *informativeness*, the stereotypes of Western astrological signs are not only intrinsically interesting, but also culturally novel to the Chinese. Indeed, our pilot study found that 82.9% of Chinese participants agreed with the statement: "Astrological signs are interesting to discuss." Because astrological signs are entertaining, major Chinese websites feature astrology as a prominent section, which can exacerbate the persistence and spread of astrological stereotypes.

Can groundless stereotypes cause discrimination? As groundless stereotypes persist and spread, can they cause discrimination in society? An affirmative answer seems intuitive, because stereotypes are cognitive structures that "systematically affect how people perceive, process information about, and respond to, group members" (Dovidio, Hewstone, Glick, & Esses, 2010, p. 8). However, this question has been empirically challenging because stereotypes and discrimination are mutually reinforcing (Jost & Banaji, 1994; North & Fiske, 2014): While stereotypes can lead to discrimination, discrimination can also exacerbate stereotypes (Dovidio, Brigham, Johnson, & Gaertner, 1996). Hence, Dovidio and colleagues (1996) called for more research to "address more fully the *causal* nature" of the relationship between stereotypes and discrimination (p. 310; italics in original). This challenge can be addressed by exogenous stereotypes because they emerge from arbitrary social categorization without preexisting discrimination, thus precluding the causal direction from discrimination to stereotypes. For example, because the astrological signs were introduced into China from the West (e.g., there was no social category called "Virgo" in China), naturally there had been no prior discrimination against any particular signs.

An Integrative Model of Stereotypes and Social Reality

To summarize our theoretical perspective on stereotypes and social reality, Figure 1 presents an integrative model that captures both endogenous and exogenous stereotype formation. As reviewed above, past research has focused on endogenous stereotype formation, where stereotypes emerge from preexisting social reality—although the process of stereotype formation may be shaped by cognitive and motivational biases (Brown & Turner, 2002). At the same time, stereotypes can also shape social reality via discrimination. This cycle is captured by the lower part of the model. Because stereotypes and social reality are mutually reinforcing, it is often unclear whether a given stereotype has emerged from preexisting social reality, or instead has shaped social reality over time to resemble the stereotype—thus, the chicken-or-egg problem. To help disentangle stereotypes from social reality, the upper part of the model illustrates an exogenous process of stereotype formation. When arbitrary social categories are introduced, the cultural meanings of category cues (e.g., category names) can be exogenously projected as stereotypes onto those social categories. Because exogenous stereotypes are not grounded in social reality to begin with, they enable us to ascertain whether stereotypes can form without social reality, yet still shape social reality via discrimination.

Overview of the Present Research

To address the chicken-or-egg puzzle, the present research examines a novel form of stereotyping and discrimination in China based on Western astrological signs. Astrological stereotypes did not emerge endogenously from preexisting social reality, as the social categorization of Western astrological signs had not existed in China before. Instead, it appears that astrological stereotypes were produced exogenously as a result of how the astrological signs were translated into the Chinese language: The cultural meanings of the Chinese translations of the astrological signs appear to have been exogenously projected as stereotypes onto the astrological signs (as demonstrated in Studies 1 to 3). Even in the absence of preexisting social reality, these groundless astrological stereotypes can still lead Chinese individuals to discriminate against certain astrological signs (as demonstrated in Studies 4 to 6). Furthermore, because Western astrological signs were popularized in China only recently (*The New York Times*, 2017), astrological stereotypes are unlikely to have had sufficient time to shape social reality to mirror the stereotypes—in contrast to well-established stereotypes that have existed for long periods of time (North & Fiske, 2014). By documenting astrological stereotypes and discrimination in China, we provide a real-world demonstration that stereotypes can form without social reality, yet still produce discrimination that can then shape social reality.

To systematically investigate astrological stereotypes and discrimination in China, we conducted nine studies using mixed methods (survey, text analysis, experiment, and archival analysis). First, we explored the existence, contents, and formation of astrological stereotypes in China (Studies 1a and 1b). To examine the role of cultural context in exogenous stereotype formation, we conducted a comparative study in the United States (Study 2). To ascertain the role of social category cues in exogenous stereotype formation, Study 3 examined whether Chinese participants would perceive an astrological sign differently when it was translated in two different ways (i.e., astrological translation vs. astronomical translation). Next, across a field experiment on a popular Chinese dating app (Study 4) and two job recruitment experiments (Studies 5 and 6), we investigated whether astrological stereotypes can lead Chinese individuals to discriminate in romantic dating and job recruitment. Finally, by analyzing large samples, Study 7 (N = 173,709) and Study 8 (N = 32,878) tested whether astrological

stereotypes are inaccurate and astrological discrimination is irrational.

Study 1a: Initial Exploration of Western Astrological Signs in China

As an initial exploration, Study 1a had four goals. First, we examined Chinese individuals' familiarity with and beliefs about Western astrological signs. Second, we investigated whether certain astrological signs are indeed disfavored in China. Third, we probed whether Chinese individuals would be willing to discriminate astrologically in social interactions, romantic dating, and job recruitment. Fourth, we explored the channels through which Chinese individuals learn about astrological signs, thereby shedding light on the formation of astrological stereotypes.

Method

Participants. Participants were recruited via www.wjx.cn (also known as www.sojump.com), a reliable Chinese data collection platform similar to Amazon Mechanical Turk (MTurk) and widely used in prior studies (Buchtel et al., 2015; Peng & Xie, 2016; Yang, Liu, Fang, & Hong, 2014). The platform attracts an average of over one million participants per day. Its participant pool features diverse age groups, occupations, income levels, and geographical locations in China (for details, see https://www.wjx.cn/sample/service.aspx). The characteristics of wjx participants are comparable with those of the 695 million Chinese netizens nationwide (China Internet Network Information Center, 2019).[2]

Following the norm at wjx, we compensated each participant 3 Chinese yuan for a short survey. We programmed the study such that wjx automatically excluded participants who failed our attention check question (see below), yielding a total of 508 qualified Chinese participants (61.8% female; $M_{age} = 29.83$, $SD_{age} = 7.89$). Their educational backgrounds were: 0.8% middle school or below, 3.7% high school, 13.4% associate degree, 75.8% bachelor's degree, and 6.3% master's degree or above.

Familiarity with astrological signs. To assess how familiar Chinese participants were with Western astrological signs, we asked how much they agreed with the following statement: "I am familiar with astrological signs" (1 = *strongly disagree*, 7 = *strongly agree*).

Beliefs about astrological signs. To assess Chinese participants' beliefs about astrological signs, we asked how much they agreed with the following two statements: (a) "Astrological sign has an influence on personality"; (b) "Knowing the astrological sign of a person helps understand that person" (1 = *strongly disagree*, 7 = *strongly agree*).

Perceived societal evaluation. To explore which of the 12 astrological signs might face discrimination in China, we asked participants to select the most negatively evaluated sign in Chinese society (an "unsure" option was available).

Willingness to discriminate. Participants who selected an astrological sign (rather than "unsure") also answered three questions about their own likelihood to discriminate against that astrological sign in three different situations: (a) "In social interactions, would you disfavor individuals of this astrological sign?" (b) "If you were seeking a romantic partner, would you disfavor individuals of this astrological sign?" (c) "If you were responsible for job recruitment, would you disfavor individuals of this astrological sign?" (1 = *very unlikely*, 7 = *very likely*). The display order of these three questions was randomized across participants.

Dissemination channels. Participants were asked to select all the channels through which they learned about astrological signs (multiple choices): (a) personal experiences, (b) observations of others' experiences, (c) social media platforms such as websites and blogs, (d) social conversations, and (e) other channels. The display order of the first four options was randomized across participants.

Attention check. To ensure the quality of participants, we included an attention check question: "How much do you agree that blood type has an influence on personality? Please select 'strongly agree' for this question." Participants who failed this attention check were excluded.

Demographics. At the end of the survey, participants reported their gender, educational background, and birthdate. We coded each participant's age and astrological sign from his or her birthdate. Because astrologers do not agree on the beginning date and the end date of each astrological sign, there are minor disagreements in the categorization of astrological signs (Hartmann, Reuter, & Nyborg, 2006). For example, September 22 could be Virgo or Libra depending on the categorization method. All results in this article were robust across different categorization methods.

Results

Familiarity with and beliefs about astrological signs. The majority of Chinese participants (72.6%) indicated "strongly agree," "agree," or "somewhat agree" to the statement: "I am familiar with astrological signs"; a one-sample t test confirmed that the mean score ($M = 4.78$, $SD = 1.29$) was significantly higher than the midpoint of the 7-point scale, $t(507) = 13.53$, $p < .001$.

The majority of Chinese participants indicated "strongly agree," "agree," or "somewhat agree" to the statement: "Astrological sign has an influence on personality" (64.6%); the mean score ($M = 4.78$, $SD = 1.48$) was significantly higher than the midpoint of the 7-point scale, $t(507) = 11.88$, $p < .001$. Similarly, the majority of Chinese participants indicated "strongly agree," "agree," or "somewhat agree" to the statement: "Knowing the astrological sign of a person helps understand that person" (64.8%); the mean score ($M = 4.78$, $SD = 1.50$) was significantly higher than the midpoint of the 7-point scale, $t(507) = 11.70$, $p < .001$. These results indicate that many Chinese participants believe that astrological sign predicts personality.

[2] In examining the comparability between wjx participants and general Chinese netizens, Peng and Xie (2016, p. 1392) noted that "the nationwide Chinese netizens have the following characteristics: gender (54% males), age (10–19 years old: 21%; 20–29: 30%; 30–39: 24%; 40–49: 13%; above 50: 9%), occupation (students as the largest group: 25%), and monthly income (less than 1,000 Yuan: 28%; 1,001–2,000: 14%; 2,001–3,000: 18%; 3,001–5,000: 23%; more than 5,001: 17%). The Sojump sample pool has the following characteristics: gender (52% males), age (10–20 years old: 26%; 21–30: 55%; 31–40: 16%; above 41: 3%), occupation (students as the largest group: 28%), monthly income (less than 1,000 Yuan: 27%; 1,001–2,000: 28%; 2,001–3,000: 22%; 3,001–4,000: 11%; more than 4,000: 12%)." To ascertain the generalizability of our findings, future research could recruit Chinese participants from other sources.

Perceived societal evaluation. As illustrated by Figure 2a, the 12 astrological signs were not equally selected as the most negatively evaluated sign in Chinese society, $\chi^2(11) = 649.89$, $p < .001$. While 163 participants selected "unsure," 44.6% of the remaining 345 participants selected Virgo as the most negatively evaluated sign in Chinese society. Moreover, analyses based on birthdate revealed that 40 participants selected their *own* astrological sign as the most negatively evaluated in Chinese society; 16 of these 40 participants were Virgos (40.0%), suggesting that Virgos are aware of their sign's negative evaluation in Chinese society.

Willingness to discriminate. Despite social desirability concerns, as many as 46.4% of participants indicated that in *romantic dating*, they would be "very likely," "likely," or "somewhat likely" to disfavor individuals of the sign that they had selected as the most negatively evaluated in Chinese society. For *social interactions*, this disfavor percentage was 42.0%. For the more objective and formal process of *job recruitment*, this disfavor percentage was 22.6%. In particular, among the 154 participants who selected Virgo as the most negatively evaluated sign in Chinese society, as many as 46.8% indicated that they would likely disfavor Virgos in *romantic dating*. These results suggest that astrological discrimination exists in China.

Dissemination channels. Most participants indicated that they learned about astrological signs from social media platforms (89.6%) and social conversations (67.1%), versus from their personal experiences (39.2%), observations of others' experiences (25.0%), or other channels (1.0%); Friedman $\chi^2 = 482.97$, $p < .001$. That is, most people learned about astrological signs indirectly through social media and social conversations rather than directly through personal experiences.

Discussion

Study 1a revealed several important insights. First, a large percentage of the Chinese participants were familiar with and believed in the predictive validity of Western astrological signs. Second, there was a large consensus that Virgo is the most negatively evaluated sign in China, which Virgos themselves are aware of. Third, a large percentage of the participants admitted that they would be likely to discriminate astrologically in romantic dating, social interactions, and job recruitment (especially against Virgos). Fourth, most participants learned about astrological signs indirectly through social media and social conversations rather than directly through personal experiences. This result provides suggestive evidence that astrological stereotypes were not distilled from preexisting social reality. Social communication—either via social media or social conversations—has likely facilitated the persistence and spread of astrological stereotypes in China (Lyons & Kashima, 2003).

Study 1b: Astrological Stereotypes in China

The purpose of Study 1b was twofold. First, we aimed to replicate Study 1a's findings. Second, we more directly examined the salience, contents, and origin of astrological stereotypes in China. In doing so, we provide insight into whether arbitrary social categorization can create groundless stereotypes when social categories contain culturally meaningful cues.

Method

Participants. As in Study 1a, 518 qualified Chinese participants were recruited via www.wjx.cn and compensated 3 Chinese yuan (57.5% female; $M_{age} = 30.43$, $SD_{age} = 7.88$). Their educational backgrounds were: 0.8% middle school or below, 4.4% high school, 12.9% associate degree, 72.8% bachelor's degree, and 9.1% master's degree or above.

Procedures and measures. The procedures and measures of Study 1b were identical to those of Study 1a, except that one question was added at the beginning of the study: "From the 12

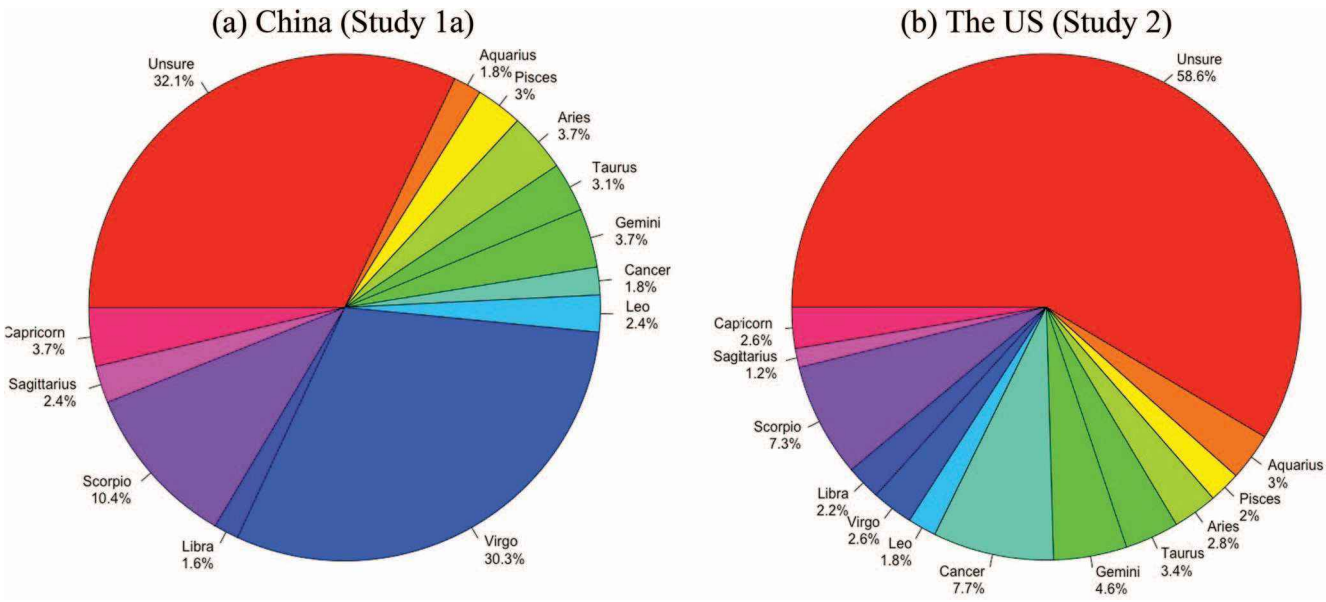

Figure 2. What is the most negatively evaluated astrological sign in society? See the online article for the color version of this figure.

astrological signs below, please select three or more astrological signs that you are most familiar with, and describe their personalities with adjectives."

Results

Astrological stereotypes. The 12 astrological signs were not equally selected as the most familiar sign, $\chi^2(11) = 219.84$, $p < .001$: Whereas Virgo was selected by 57.5% of participants, each of the other 11 signs was selected by fewer than 30% of participants. This result suggests that Virgo has the most salient stereotypes in China, possibly because of the sensitivity of the word "virgin" (Song, 2015). Text analysis of the Virgo adjectives revealed that participants stereotyped Virgo's personality as disagreeable, with synonyms of "critical" and "germophobic" accounting for over 81% of the adjectives, possibly because in China the word "old virgin" ("老处女") is used to describe spinsters who are critical, fussy, and picky about men (Bullough & Ruan, 1994). Table 1 summarizes the most common personality stereotypes of each astrological sign in China (as coded by two native Chinese speakers). Consistent with our theoretical perspective, these astrological stereotypes are largely explained by how the astrological signs were translated into Chinese. For example, Taurus is stereotyped as both (a) materialistic and (b) conscientious and stubborn, likely because it has been translated as "gold bull" in Chinese. Gemini is stereotyped as having a dual-personality and being temperamental, likely because its Chinese translation is literally "two persons." Cancer (the Crab) is stereotyped as home-loving, possibly because of the cultural association that crabs always stay in their shells.

Replication of Study 1a. For the remaining questions (familiarity with astrological signs, beliefs about astrological signs, perceived societal evaluation, willingness to discriminate astrologically, and dissemination channels), Study 1b fully replicated the results of Study 1a. In particular, a large percentage of participants selected Virgo as the most negatively evaluated sign in China, and self-reported that they would likely discriminate against Virgos in romantic dating, social interactions, and job recruitment. For details, see online supplemental materials.

Discussion

Study 1b provided evidence that astrological stereotypes in China formed as a result of how the astrological signs were translated into Chinese; the cultural meanings of the Chinese translations of the 12 astrological signs appear to have been exogenously projected as stereotypes onto the astrological signs. These astrological stereotypes provide a real-world demonstration that when arbitrary social categories are introduced, the cultural meanings of category cues (e.g., semantic category names) can be exogenously projected as stereotype contents onto those social categories. Whereas the Minimal Group Paradigm demonstrates how arbitrary social categorization can produce *general* ingroup versus outgroup biases (Otten & Moskowitz, 2000), our study demonstrated how arbitrary social categorization plus culturally meaningful category cues can produce *particular* stereotype contents about *particular* groups.

Study 2: The Role of Cultural Context in Exogenous Stereotype Formation

We have posited that the contents of exogenous stereotypes depend on the specific *cultural context*. The same social category will likely have different stereotypes (or no stereotype) if its category cues have different meanings (or no meaning) in different cultures. To examine the importance of cultural context in the formation of exogenous stereotypes, we next conducted a comparative study in the United States. Unlike Chinese characters, English letters do not have semantic meanings. For example, it is not obvious that "T-a-u-r-u-s" means "bull" in English, whereas the two characters comprising its Chinese translation "金-牛" literally mean "gold" and "bull," respectively. Moreover, whereas the English names for astrological signs (e.g., Taurus) are used only in the context of astrology, the Chinese characters of their Chinese names (e.g., "金" and "牛") are used ubiquitously in everyday life. Thus, we expected astrological stereotyping to be weaker in the United States than in China.

Table 1
Astrological Stereotypes in China (Study 1b)

Astrological sign	Most common personality stereotypes	From (dd-mm)	To (dd-mm)	Astrological element	Astrological gender
Aries (白羊)	tender (柔善; 24%), straightforward (直白; 22%)	22-03	18-04	Fire	Masculine
Taurus (金牛)	materialistic (爱财; 30%), conscientious (勤恳; 31%), stubborn (固执; 19%)	22-04	19-05	Earth	Feminine
Gemini (双子)	temperamental (善变; 31%), dual-personality (双重性格; 28%)	23-05	19-06	Air	Masculine
Cancer (巨蟹)	home-loving (顾家; 33%)	23-06	20-07	Water	Feminine
Leo (狮子)	bold (勇猛; 30%), proud (骄傲; 20%), leader (领导; 17%)	24-07	21-08	Fire	Masculine
Virgo (处女)	critical (苛刻; 46%), germophobic (洁癖; 35%)	25-08	21-09	Earth	Feminine
Libra (天秤)	fair (公平; 22%), indecisive (犹豫; 19%)	25-09	21-10	Air	Masculine
Scorpio (天蝎)	venomous (腹黑; 26%), vindictive (记仇; 16%)	25-10	20-11	Water	Feminine
Sagittarius (射手)	carefree (随性; 35%)	24-11	19-12	Fire	Masculine
Capricorn (摩羯)	arcane (深奥; 24%)	23-12	18-01	Earth	Feminine
Aquarius (水瓶)	imaginative (聪颖; 24%), idiosyncratic (独特; 27%)	22-01	17-02	Air	Masculine
Pisces (双鱼)	moody (多愁善感; 30%)	20-02	18-03	Water	Feminine

Note. Each of these astrological stereotypes (and their synonyms) comprised at least 15% of the adjectives that participants listed for each sign. For each stereotype, its Chinese translation and percentage are listed in parentheses. The date range, astrological element, and astrological gender of each sign are also tabulated. The date range represents a conservative categorization of astrological signs, as there are minor disagreements among astrologers (Hartmann, Reuter, & Nyborg, 2006).

Method

Participants. American participants were recruited via MTurk and compensated $0.50 for a short survey. Participants qualified only if they were native English speakers from the United States and had an approval rate above 95% for their previous tasks on MTurk. Participants were excluded if they failed our attention check question, yielding a total of 495 participants for the purpose of data analysis (44.6% female; $M_{age} = 33.16$, $SD_{age} = 10.42$). Their educational backgrounds were: 0.4% below high school, 11.1% high school, 28.5% some college, 43.6% bachelor's degree, and 16.4% master's degree or above.

Procedures and measures. The procedures and measures of Study 2 were similar to those of Study 1a. All measures were translated into English following the translation and back-translation procedure (Brislin, 1970).

Results

Familiarity with astrological signs. American participants ($M = 3.98$, $SD = 1.77$) were significantly less familiar with astrological signs than their Chinese counterparts in Study 1a ($M = 4.78$, $SD = 1.29$), $t(904.23) = -8.17$, $p < .001$, $d = -.52$, 95% confidence interval (CI) [−0.99, −0.61].

Beliefs about astrological signs. American participants ($M = 3.45$, $SD = 1.92$) were significantly less likely to agree with the statement "Astrological sign has an influence on personality" than their Chinese counterparts in Study 1a ($M = 4.78$, $SD = 1.48$), $t(927.38) = -12.29$, $p < .001$, $d = -.78$, 95% CI [−1.54, −1.12]. Similarly, American participants ($M = 3.40$, $SD = 1.93$) were significantly less likely to agree with the statement "Knowing the astrological sign of a person helps understand that person" than their Chinese counterparts in Study 1a ($M = 4.78$, $SD = 1.50$), $t(931.41) = -12.60$, $p < .001$, $d = -.80$, 95% CI [−1.59, −1.16].

Perceived societal evaluation. As illustrated by Figure 2b, 58.6% of American participants selected "unsure" when asked to select the most negatively evaluated sign in American society, whereas only 32.1% of Chinese participants in Study 1a selected "unsure" ($\chi^2 = 71.09$, $p < .001$). This result suggests that astrological stereotyping is much weaker in the United States than in China. Relatedly, in contrast to the widely shared negative evaluation of Virgo in Chinese society, there was little consensus on the most negatively evaluated astrological sign in American society. Nevertheless, the largest percentage of American participants (7.7%) selected Cancer as the most negatively evaluated sign in American society (Figure 2b), possibly because of its semantic association with the disease cancer.

Willingness to discriminate. American participants indicated significantly lower likelihood to disfavor individuals of their selected astrological sign than their Chinese counterparts in Study 1a, whether in romantic dating ($M_{USA} = 3.22$, $SD_{USA} = 1.96$, $M_{China} = 3.94$, $SD_{China} = 1.87$; $t[413.66] = -4.22$, $p < .001$, $d = -.37$, 95% CI [−1.05, −0.38]), social interactions ($M_{USA} = 2.97$, $SD_{USA} = 1.78$, $M_{China} = 3.78$, $SD_{China} = 1.55$; $t[383.88] = -5.38$, $p < .001$, $d = -.48$, 95% CI [−1.10, −0.51]), or job recruitment ($M_{USA} = 2.60$, $SD_{USA} = 1.76$, $M_{China} = 3.08$, $SD_{China} = 1.62$; $t[401.79] = -3.16$, $p = .002$, $d = -.28$, 95% CI [−0.77, −0.18]).

Discussion

Complementing Studies 1a and 1b, Study 2 demonstrated that astrological stereotyping is not salient in the United States, possibly because the English names for astrological signs are culturally opaque. Although American participants exhibited little consensus on the most negatively evaluated sign in the United States, the largest percentage selected Cancer, possibly because of its semantic association with the disease cancer. By contrast, Study 1a found that Cancer individuals are stereotyped as home-loving in China, possibly because of the cultural association that crabs always stay in their shells. Together, these findings highlight the importance of cultural context in exogenous stereotype formation.

Study 3: The Role of Category Cues in Exogenous Stereotype Formation

According to our theorization, the contents of exogenous stereotypes also depend on specific category cues (in addition to the specific cultural context), because different cues of the same social category can evoke different cultural meanings. Thus, Study 3 further examined the role of social category names in exogenous stereotype formation. We tested whether Chinese participants would perceive an astrological sign differently when it was translated in different ways. Specifically, we leveraged the interesting fact that there are two Chinese translations of Virgo: Whereas "处女" ("virgin") is the well-known translation in astrology, "室女" ("royal chamber lady") is the lesser-known translation in *astronomy*. Because the word "royal chamber lady" conceivably conveys a more agreeable image than "virgin" in Chinese, we hypothesized that Chinese participants would perceive Virgo as more agreeable when translated as "royal chamber lady" than when translated as "virgin".

Method

The study was preregistered at https://aspredicted.org/sg5r7.pdf.

Participants. We used G*Power to determine the sample size for a small-sized effect: 382 participants were required for the study to be powered at 90%. As in Studies 1a and 1b, we recruited Chinese participants via www.wjx.cn. They were each compensated 3 Chinese yuan for this short study. As explained below, we programmed the study such that wjx automatically excluded (a) participants who were familiar with astrological signs and (b) participants who failed our attention check question, yielding 388 qualified Chinese participants (63.9% female; $M_{age} = 28.03$, $SD_{age} = 7.36$). Their educational backgrounds were: 0.3% middle school or below, 4.1% high school, 13.7% associate degree, 73.7% bachelor's degree, and 8.2% master's degree or above.

Experimental design. Participants were randomly assigned to one of two experimental conditions in a between-subjects design: *virgin* condition or *royal chamber lady* condition.

Procedures and measures. Upon consenting to the study, participants viewed the profile of a Virgo individual: a 28-year-old who has a gender-neutral name, holds a college degree, and enjoys photography, online shopping, and writing as hobbies. The profile was identical across the two conditions, except that Virgo was translated as "处女座" (virgin) versus "室女座" (royal chamber lady).

Agreeableness. Based on the agreeableness subscale from Gosling, Rentfrow, and Swann (2003), we asked participants how strongly they agreed that the following adjectives described the individual: "critical" (reverse coded), "quarrelsome" (reverse coded), "sympathetic," "warm" (1 = *strongly disagree*, 6 = *strongly agree*; $\alpha = .71$). The display order of the four items was randomized across participants.

Familiarity with astrological signs. On the next screen, we asked participants: "How familiar are you with astrological signs?" (1 = *very unfamiliar*, 6 = *very familiar*). To mimic the initial stereotype formation of astrological stereotypes, we examined whether participants *unfamiliar* with astrological signs would be influenced by the "virgin" versus "royal chamber lady" translations *per se*. Thus, as stated in our preregistration, our analyses only included the 388 participants who indicated that they were "very unfamiliar," "unfamiliar," and "somewhat unfamiliar" with astrological signs.

Attention check. As stated in our preregistration, to ensure the quality of participants, we included an attention check question on the next screen: "What is the person's astrological sign?" We disqualified participants who failed to select "Virgo" (translated as either "virgin" or "royal chamber lady" depending on the experimental condition) from a drop-down list of the 12 astrological signs.

Demographics. At the end of the survey, participants reported their gender, educational background, and birthdate.

Results and Discussion

As hypothesized, an independent-samples *t* test confirmed that Chinese participants perceived the profile as significantly less agreeable when Virgo was translated as "virgin" ($M = 3.73$, $SD = .78$) than when translated as "royal chamber lady" ($M = 4.07$, $SD = .78$), $t(385.77) = -4.36$, $p < .001$, $d = -.44$, 95% CI $[-0.50, -0.19]$.[3]

These results suggest that the translation "virgin" has likely contributed to the Chinese stereotype that Virgos are disagreeable, thereby highlighting the role of category cues in exogenous stereotype formation.

Study 4: Astrological Discrimination in Romantic Dating

Thus far, by analyzing astrological stereotypes in China, we have provided evidence that groundless stereotypes can form exogenously in the absence of preexisting social reality (i.e., the first piece of the chicken-or-egg puzzle). Next, we move to the second piece of the chicken-or-egg puzzle: Can groundless stereotypes shape social reality via discrimination? Specifically, we examined whether these astrological stereotypes would lead Chinese individuals to discriminate in everyday life, especially because many Chinese participants in Studies 1a and 1b admitted that they would.

In Study 4, we conducted a 9-day field experiment on a popular Chinese dating app to test whether Chinese individuals would discriminate on the basis of astrological signs in romantic dating, a consequential activity that shapes people's lives. In particular, we examined whether Chinese individuals would discriminate against Virgos, because Studies 1a and 1b revealed that Virgo is perceived as the most negatively evaluated sign in China.

Method

The study was preregistered at https://aspredicted.org/nb85t.pdf.

Experimental setting. The experiment was conducted on Tantan, a Chinese dating app similar to Western dating apps like OkCupid and Tinder. We chose Tantan as the study setting mainly for two reasons. First, Tantan automatically displays the astrological sign of each user beneath his or her profile picture (see Figure 3). Second, Tantan is one of the most popular Chinese dating apps, with over 22.66 million active users (BigData-Research, 2018).

Experimental design and procedures. The study involved three conditions in a between-subjects design: *Virgo*, *Leo*, or *Libra*. According to the astrological calendar, Leo comes immediately *before* Virgo, whereas Libra comes immediately *after* Virgo (see Table 1).

We created three Tantan VIP accounts on three iPhones simultaneously. As shown in Figure 3, the three profiles displayed the same photo (of the first author), same nickname (Michael), and same age (28 years old); the only difference across the three profiles was the astrological sign displayed (Virgo vs. Leo vs. Libra).

We used Tantan's default setting such that the profile was randomly shown to the numerous female users within 100 km of the roaming location. Tantan's VIP privilege ($1.99/month) enabled us to change the roaming location at any time. For Days 1∼3, we set the roaming locations of the three profiles to be Virgo-Beijing, Leo-Shanghai, and Libra-Shenzhen, respectively. This design precluded the possibility that a user might stumble upon more than one of our Michaels (though this would be improbable given Tantan's vast user pool). To counterbalance, we switched the roaming locations for Days 4∼6 (Virgo-Shanghai, Leo-Shenzhen, and Libra-Beijing) and again for Days 7∼9 (Virgo-Shenzhen, Leo-Beijing, and Libra-Shanghai). This counterbalancing design also enabled us to examine whether the discrimination against Virgos would generalize across different Chinese cities.

Our outcome variable was the number of "likes" each Michael received. Because we never touched the "like" button, there was never a "match" (which occurs when both sides "like" each other).

Results and Discussion

Over the course of 9 days, whereas the Leo Michael received 41 "likes" and the Libra Michael received 46 "likes," the Virgo Michael only received 15 "likes"; $\chi^2(2) = 16.29$, $p < .001$. As shown in Table 2, the Virgo Michael consistently received the fewest "likes" in each of the three Chinese cities. These results provide experimental evidence for astrological discrimination in romantic dating in China.

Study 5: Astrological Discrimination in Job Recruitment

To further examine whether groundless stereotypes can cause discrimination in society, Study 5 tested whether astrological ste-

[3] Because both "virgin" and "royal chamber lady" are gendered words, we also explored the interaction between experimental condition and participant gender; the interaction effect was not significant ($F = .34$, $p = .56$).

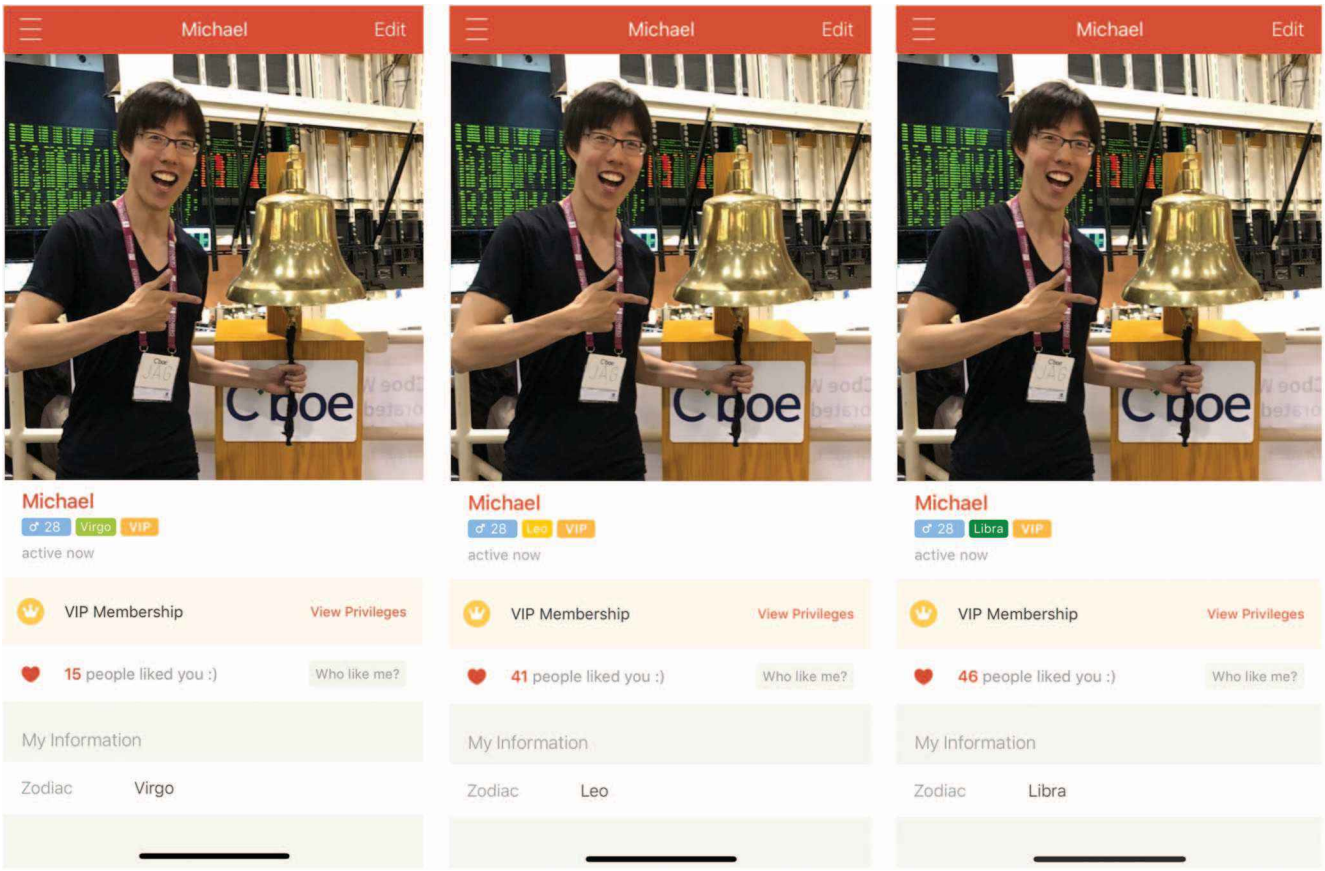

Figure 3. The three Tantan profiles (Study 4). Each user can choose Tantan's display language on their phone. Thus, the above profiles were shown in Chinese for most Chinese users. See the online article for the color version of this figure.

reotypes would lead Chinese individuals to discriminate in job recruitment—another consequential activity that shapes people's lives. Specifically, we tested whether Chinese individuals would be less willing to hire a Virgo job candidate because they perceive Virgos as less agreeable.

Method

The study was preregistered at https://aspredicted.org/ub29z.pdf.

Participants. We used G*Power to determine the sample size for a small-sized effect: 768 participants were required for the study to be powered at 95%. As in Studies 1a, 1b, and 3, we recruited Chinese participants via www.wjx.cn. All participants were currently employed. They were each compensated 4 Chinese yuan for this short study. We programmed the study such that wjx automatically excluded participants who failed any of our attention check questions (see below), yielding 823 qualified Chinese participants (62.1% female; M_{age} = 29.65, SD_{age} = 7.13). Their educational backgrounds were: 1.1% middle school or below, 4.3% high school, 19.6% associate degree, 64.0% bachelor's degree, and 10.9% master's degree or above.

Table 2
The Number of "Likes" Received on Tantan (Study 4)

City	Virgo condition	Leo condition	Libra condition
Beijing	5	16	15
Shanghai	7	14	18
Shenzhen	3	11	13
Total	15	41	46

Note. The Virgo profile received the fewest "likes" in each of the three Chinese cities.

Experimental design and materials. Participants were randomly assigned to one of four experimental conditions in a between-subjects design: *Virgo explicit* condition, *Libra explicit* condition, *Virgo implicit* condition, or *Libra implicit* condition.

Similar to prior profile experiments (Lu, Nisbett, & Morris, 2020; Moss-Racusin, Dovidio, Brescoll, Graham, & Handelsman, 2012; Pager, Bonikowski, & Western, 2009), our experimental material was a one-page job résumé. To ensure external validity, we adapted it from the résumé of a real Chinese job candidate who had searched for jobs recently. The candidate was a 23-year-old male college graduate from a reputable Chinese university. The résumé was identical across the four conditions except for the birthdate section, which specified "1995-09-20 (Virgo)" in the *Virgo explicit* condition, "1995-09-25 (Libra)" in the *Libra explicit*

condition, "1995-09-20" in the *Virgo implicit* condition (without explicitly mentioning "Virgo"), and "1995-09-25" in the *Libra implicit* condition (without explicitly mentioning "Libra"). The dates 09-20 and 09-25 actually corresponded to Virgo and Libra, respectively.

We chose this four-condition design for two reasons. First, the dates of 09-20 and 09-25 are both in September and temporally close to each other, thus precluding potential confounding effects of month or season. Second, we included the two *implicit* conditions to explore whether Chinese participants would automatically infer "Virgo" or "Libra" from the birthdate alone and discriminate against the Virgo candidate even when his astrological sign was not explicitly mentioned.

Pilot interviews with human resources (HR) professionals suggested that it is not uncommon to see astrological signs on job résumés in China. Indeed, when asked what our study was about, only three of the 823 participants correctly guessed its true purpose, suggesting that it was not strange for Chinese participants to see an astrological sign on the job résumé in the *Virgo explicit* and *Libra explicit* conditions.

Procedures and measures. Upon consenting to the study, participants were told to imagine that they were in charge of employee recruitment and that they would be presented with the résumé of a job candidate for the position of office assistant. They were instructed to read the résumé carefully to make an informed decision.

Willingness to hire. Participants viewed the résumé (for at least 1 min before they could proceed) and answered the following question: "If your company had a vacancy for the office assistant position, how willing would you be to hire this candidate?" (1 = *very unwilling*, 6 = *very willing*). This question served as our measure of discrimination.

Perceived personality. Based on the résumé, participants rated the job candidate on the Ten-Item Personality Inventory (Gosling et al., 2003; see Appendix for its Chinese version), which is widely utilized to assess the Big Five personality dimensions (1 = *strongly disagree*, 6 = *strongly agree*). The display order of the 10 items was randomized across participants. For our hypothesized mediator of perceived agreeableness, the two items were "critical, quarrelsome" (reverse coded) and "sympathetic, warm" (Gosling et al., 2003).

Attention checks. To ensure the quality of participants, on the next screen we included three attention check questions: (a) "To which position is the candidate applying?" (*receptionist, HR assistant, office assistant* [correct answer], *CEO secretary*); (b) "What is the candidate's hobby?" (*photography* [correct answer], *painting, piano, swimming*); (c) "What is the candidate's astrological sign?" (*unsure*, *Aries*, *Taurus* . . .). For this astrological sign question, we disqualified participants who did not select "Virgo" in the *Virgo explicit* condition and participants who did not select "Libra" in the *Libra explicit* condition; all results were robust when we included these participants.

Demographics. At the end of the survey, participants reported their gender, educational background, and birthdate. We coded each participant's own astrological sign and age from his or her birthdate.

Results

When probed about the astrological sign of the job candidate, 92.8% of the participants in the *Virgo implicit* condition did not select "Virgo" and 90.7% of the participants in the *Libra implicit* conditions did not select "Libra". Thus, these two conditions effectively functioned as control conditions. They did not differ significantly in any variables (e.g., willingness to hire, perceived personality).

Willingness to hire (measure of discrimination). A one-way analysis of variance (ANOVA) found that the four conditions differed significantly in willingness to hire the candidate, $F(3, 819) = 4.95$, $p = .002$. As hypothesized, the candidate in the *Virgo explicit* condition faced more discrimination than in the other three conditions. Specifically, participants in the *Virgo explicit* condition ($M = 4.77$, $SD = 1.11$) were significantly less willing to hire the candidate than those in the *Libra explicit* condition ($M = 5.01$, $SD = .79$; $t[377.78] = -2.58$, $p = .010$, $d = -.25$, 95% CI $[-0.43, -0.06]$), those in the *Virgo implicit* condition ($M = 5.08$, $SD = .73$; $t[358.87] = -3.35$, $p < .001$, $d = -.33$, 95% CI $[-0.49, -0.13]$), and those in the *Libra implicit* condition ($M = 5.00$, $SD = .82$; $t[382.42] = -2.46$, $p = .015$, $d = -.24$, 95% CI $[-0.42, -0.05]$). The *Libra explicit* condition, the *Virgo implicit* condition, and the *Libra implicit* condition did not differ significantly in willingness to hire the job candidate, $F(2, 611) = .52$, $p = .60$. These results provided evidence for astrological discrimination against Virgos in job recruitment in China.

Perceived personality. A one-way ANOVA found that the four conditions differed significantly in the perceived agreeableness of the candidate, $F(3, 819) = 5.75$, $p < .001$. As hypothesized, the candidate in the *Virgo explicit* condition ($M = 4.50$, $SD = .80$) was perceived as significantly less agreeable than in the *Libra explicit* condition ($M = 4.71$, $SD = .65$; $t[396.39] = -2.93$, $p = .004$, $d = -.29$, 95% CI $[-0.35, -0.07]$), the *Virgo implicit* condition ($M = 4.75$, $SD = .69$; $t[406.10] = -3.48$, $p < .001$, $d = -.33$, 95% CI $[-0.40, -0.11]$), and the *Libra implicit* condition ($M = 4.75$, $SD = .78$; $t[411] = -3.27$, $p = .001$, $d = -.32$, 95% CI $[-0.41, -0.10]$). The *Libra explicit* condition, the *Virgo implicit* condition, and the *Libra implicit* condition did not differ significantly in perceived agreeableness, $F(2, 611) = .27$, $p = .76$.

By contrast, one-way ANOVAs found that the four conditions did not differ significantly in the perceived conscientiousness, emotional stability, extraversion, or openness to experience of the job candidate (all $ps > .05$).

Mediation analysis. Because the *Libra explicit* condition, the *Virgo implicit* condition, and the *Libra implicit* condition did not differ significantly in either willingness to hire or perceived agreeableness of the candidate, we collapsed them into a single condition for mediation analysis. As hypothesized, perceived agreeableness significantly mediated the negative effect of the *Virgo explicit* condition (vs. the other three conditions) on willingness to hire the candidate (bootstrapped 95% CI for the indirect effect = $[-0.13, -0.04]$, $p < .001$). By contrast, perceived conscientiousness, emotional stability, extraversion, and openness to experience were not significant mediators (all bootstrapped 95% CIs included zero).[4]

Robustness check. All of the above results were robust when we excluded the participants who were Virgo or Libra themselves.

[4] All mediation results in the article were robust when we followed the recommendations of Yzerbyt and colleagues (2018).

Discussion

Study 5 provided experimental evidence for astrological discrimination in job recruitment in China. Specifically, participants were less willing to hire the job candidate when the résumé explicitly indicated that he was a Virgo; this effect was explained by the stereotype that Virgos are less agreeable. Together, Studies 4 and 5 demonstrate that exogenously formed, groundless stereotypes can cause discrimination in society.

Study 6: Astrological Discrimination in Job Recruitment (HR Professionals)

Study 6 aimed to replicate and extend Study 5's findings in three ways. First, we tested whether actual HR professionals would exhibit astrological discrimination. Second, whereas the job candidate in Study 5 was always male, Study 6 randomized the gender of the job candidate across participants. Third, to ascertain the generalizability of Study 5's findings, we contrasted Virgo with another astrological sign: Leo.

Method

The study was preregistered at https://aspredicted.org/r5up5.pdf.

Participants. Based on Study 5's results, we used G*Power to determine the sample size for a small-sized effect: 322 participants were required for the study to be powered at 85%. We programmed the study such that participants who failed any of our attention check questions were automatically excluded. The qualified participants were 351 Chinese HR professionals from 24 different industries (71.5% female; $M_{age} = 29.68$, $SD_{age} = 6.11$). They were each compensated 5 yuan for this short study. On average, they had 4.41 years ($SD = 4.39$) of experience in HR. Their educational backgrounds were: 3.4% associate degree, 52.7% bachelor's degree, and 43.9% master's degree or above. Only four HR participants correctly guessed the true purpose of the study, again suggesting that it was not strange to see astrological signs on job résumés in China.

Experimental design and materials. In Study 5, the *Virgo implicit* and *Libra implicit* conditions effectively served as control conditions, as over 90% of participants in these two conditions did not automatically infer the astrological sign of the job candidate from his birthdate. Moreover, these two conditions did not significantly differ from the *Libra explicit* condition in any variables. Because of the limited size of the HR sample, we dropped the two *implicit* conditions in the design of Study 6.

Participants were randomly assigned to one of four experimental conditions in a between-subjects design: *Virgo female* condition, *Virgo male* condition, *Leo female* condition, or *Leo male* condition.

Our experimental material was the same one-page job résumé used in Study 5, except that (a) the gender of the job candidate was randomized and (b) the birthdate section of the résumé said "1995-08-25 (Virgo)" in the two *Virgo* conditions versus "1995-08-20 (Leo)" in the two *Leo* conditions. The dates 08-25 and 08-20 actually corresponded to Virgo and Leo, respectively. As in Study 5, this design precluded potential confounding effects of month or season.

Procedures and measures. The procedures and measures were the same as in Study 5 (e.g., willingness to hire, perceived personality, attention checks, and demographics). To explore how HR professionals view astrological signs, we added a question immediately before the demographic questions: "As an HR professional, how often do you discuss the astrological signs of job candidates with your HR colleagues at work?" (1 = *never*, 6 = *very frequently*).

Results

The gender of the job candidate did not have a significant main effect on any variables (e.g., $t_{decision} = .63$, $p_{decision} = .53$; $t_{agreeableness} = .44$, $p_{agreeableness} = .66$). Thus, as stated in our preregistration, for the rest of data analysis we collapsed the four conditions into two conditions: *Virgo* condition versus *Leo* condition.

Willingness to hire (measure of discrimination). Replicating the results of Study 5, HR participants in the *Virgo* condition ($M = 4.28$, $SD = .90$) were significantly less willing to hire the candidate than HR participants in the *Leo* condition ($M = 4.55$, $SD = .95$), $t(346.05) = -2.77$, $p = .006$, $d = -.29$, 95% CI [−0.47, −0.08].

Perceived personality. Replicating the results of Study 5, the candidate in the *Virgo* condition ($M = 4.12$, $SD = .71$) was perceived as significantly less agreeable than in the *Leo* condition ($M = 4.40$, $SD = .76$), $t(345.87) = -3.49$, $p < .001$, $d = -.37$, 95% CI [−0.43, −0.12].

By contrast, the conditions did not differ significantly in the perceived conscientiousness, emotional stability, extraversion, or openness to experience of the job candidate (all ps $> .05$).

Mediation analysis. Replicating the results of Study 5, perceived agreeableness significantly mediated the negative effect of the *Virgo* condition (vs. the *Leo* condition) on willingness to hire the candidate (bootstrapped 95% CI for the indirect effect = [−0.19, −0.04], $p < .001$).

Robustness check. All of the above results were robust when we excluded the participants who were Virgo or Leo themselves.

Discussion about astrological signs. Finally, as many as 39.9% of these HR professionals reported "very frequently," "frequently," or "somewhat frequently" discussing the astrological signs of job candidates with HR colleagues at work.

Discussion

Using a sample of Chinese HR professionals, Study 6 provided further experimental evidence for astrological discrimination in job recruitment. Replicating the results of Study 5, even HR professionals were less willing to hire Virgos; this effect was again explained by the stereotype that Virgos are less agreeable.

Moreover, a large percentage of Chinese HR professionals reported frequently discussing the astrological signs of job candidates. This finding is consistent with our pilot study's finding that 82.9% of Chinese participants agreed with the statement: "Astrological signs are interesting to discuss." These results suggest that (groundless) astrological stereotypes persist and spread partly because they function as social lubricants in social communication.

Study 7: Astrological Sign Does Not Predict Personality—Even for Believers

Studies 1 to 6 have shown that in China the astrological signs are associated with salient personality stereotypes, and that some Chinese individuals discriminate on the basis of these groundless stereotypes. However, it remains empirically unclear whether these astrological stereotypes are accurate. Therefore, Study 7 investigated whether astrological sign actually predicts personality. Given that the categorization of the astrological signs is based on the position of the sun at birth, it is scientifically dubious why they should affect personality. Nonetheless, past empirical studies have found mixed results, possibly because of limited sample sizes. For example, Clarke and colleagues (1996) found that individuals with masculine signs (e.g., Aries, Libra) were significantly more extraverted than individuals with feminine signs (e.g., Virgo, Scorpio), but their study involved only 190 first-year university students. To scrutinize the link between astrological sign and personality, Study 7 used a far larger sample (N = 173,709) than past research, which enabled us to detect even small effects of astrological sign.

Method

Participants. The data were collected on an advertisement-free Chinese psychometric website (Wei et al., 2017), one similar to English websites such as the Gosling-Potter Internet Personality Project (Bleidorn et al., 2016; Gosling, Vazire, Srivastava, & John, 2004). In return for personalized feedback, participants completed a 40-item personality inventory (Saucier, 1994) and reported their birthdate, gender, and educational background.

To ensure the quality of participants, we followed prior research (Bleidorn et al., 2016; Wei et al., 2017) and applied the following selection criteria: (a) we only included participants between 18 to 60 years old because participants outside this range might be particularly susceptible to self-selection bias and therefore not representative of their age group; (b) we excluded participants who responded the same to all 40 personality items (i.e., $SD_{40\ \text{items}} = 0$); (c) we excluded participants who on average spent less than 1 s on each item; all results were robust when we adjusted this exclusion criterion to 1.5 s, 2 s, and so forth. These criteria yielded 173,709 qualified Chinese participants (48.6% female, M_{age} = 23.45, SD_{age} = 4.60). Their educational backgrounds were: 2.3% junior high school or below, 24.3% senior high school, 23.1% technical school, 38.4% associate degree, and 11.9% college degree or above.

Measures.

Personality. Each participant completed the 40-item Mini-Markers Scale ("For each trait, please write a number indicating how accurately that trait describes you"; 1 = *very inaccurate*, 7 = *very accurate*), which is widely used to assess the Big Five personality dimensions (Saucier, 1994). The order of the 40 items was randomized across participants. We first tested whether the 12 astrological signs differed in any of the Big Five, and then tested whether a given sign would be significantly higher than the other 11 signs in its respective stereotyped adjective (or synonym) from Study 1b (e.g., whether Virgo would be higher on the adjective "critical").

Astrological sign. We coded each participant's astrological sign from his or her birthdate. As shown in Table 1, each astrological sign corresponds with an astrological element (fire, water, air, or earth) and an astrological gender (masculine or feminine), which we also coded for each participant.

Birth season. Because past studies have found that birth season may predict personality (Chotai, Lundberg, & Adolfsson, 2003; Fourie, 1984), we also coded each participant's birth season. Because China is around similar latitudes as the United States, we followed prior studies to operationalize the four seasons as: Spring (March–May), Summer (June–August), Fall (September–November), Winter (December–February).

Beliefs about astrological signs. For a large subset of the participants (N = 17,373), at the end of the study we added a question about whether or not they believed in astrological signs (1 = *yes*, 0 = *no*; 55% = believers). This question enabled us to examine whether astrological sign would predict personality for *believers*, because believers might have internalized the stereotyped personalities of their astrological signs because of self-fulfilling prophecy (Hilton & von Hippel, 1996; Madon et al., 2018; Merton, 1948).

Results

As illustrated by the almost *regular* dodecagons in Figure 4, one-way ANOVAs found that astrological sign did not significantly predict agreeableness (F = .59, p = .84), conscientiousness (F = 1.75, p = .06), emotional stability (F = .32, p = .98), or openness to experience (F = 1.11, p = .35). These nonsignificant results were corroborated by Bayesian one-way ANOVAs, which compared evidence for the alternative hypothesis H_1 relative to the null hypothesis H_0. All Bayes Factors B_{10} (where "1" refers to H_1 and "0" refers to H_0) were diminutive (< .001) and therefore strongly in favor of the null hypothesis H_0. Although astrological sign appeared to have a significant effect on extraversion (F = 2.72, p = .002; Bayes Factors B_{10} < .001), this effect was in fact driven by birth season (F = 9.24, p < .001) and became nonsignificant (F = 1.22, p = .26) once we controlled for birth season. It is also noteworthy that our statistical tests were liberal, such that the effect of astrological sign became even more nonsignificant when we applied Bonferroni or Tukey adjustments of the significance level.

Consistent with Fourie's (1984) finding, individuals born in summer (M = 5.03, SD = .86) were significantly more extraverted than those born in spring (M = 5.01, SD = .85; t = 3.33, Tukey-adjusted p = .005, d = .02, 95% CI [0.005, 0.036]), fall (M = 5.01, SD = .85; t = 4.53, Tukey-adjusted p < .001, d = .03, 95% CI [0.011, 0.041]), and winter (M = 5.00, SD = .86; t = 4.64, Tukey-adjusted p < .001, d = .03, 95% CI [0.012, 0.042]). Unsurprisingly, these effect sizes were small.

The effects of astrological sign on the Big Five remained nonsignificant (all ps > .05; all Bayes Factors B_{10} < .001) when we controlled for gender, age, and education level. Moreover, neither astrological element (e.g., fire) nor astrological gender significantly predicted the Big Five personality dimensions (all ps > .05; all Bayes Factors B_{10} < .001).

Furthermore, no astrological sign differed significantly in its stereotyped adjectives from the other 11 signs (all ps > .05; all Bayes Factors B_{10} < .001). For example, Virgo was not significantly more

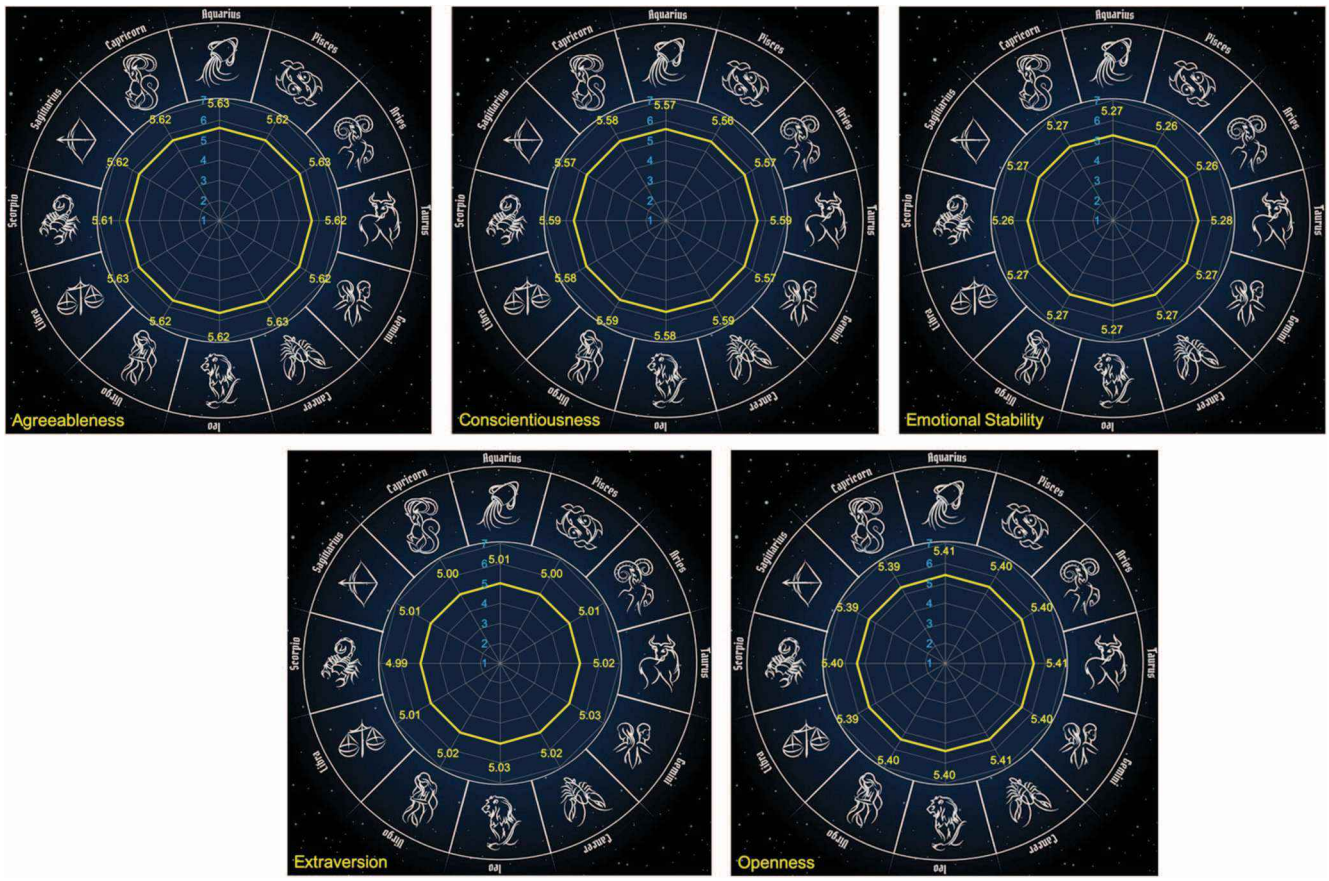

Figure 4. Mean personality scores (in yellow) by astrological sign (Study 7). The numbers in blue represent the 7-point Likert scale. The dodecagons are almost regular (i.e., same-length sides), illustrating that the mean personality scores were not meaningfully different across the 12 astrological signs. See the online article for the color version of this figure.

"critical" than the other 11 signs; Gemini was not significantly more "temperamental" than the other 11 signs, and so forth.

All of the above null results were robust when we repeated the analyses for believers only or for nonbelievers only (all *p*s $> .05$; all Bayes Factors $B_{10} < .01$).

Discussion

Despite its large sample size, Study 7 found that astrological sign did not significantly predict any of the personality traits. This null result was true for both believers and nonbelievers of astrological signs. These findings provide further evidence that the astrological stereotypes revealed in Study 1b were groundless.

Study 8: Astrological Sign Does Not Predict Job Performance

Although astrological stereotypes were groundless and not reflective of actual personality traits (Study 7), they still led Chinese individuals to discriminate in simulated job recruitment (Studies 5 and 6). Nevertheless, astrological discrimination might still be "rational" in job recruitment if the 12 signs differed in job performance. Thus, to explore whether there is a case to be made for astrological discrimination on the basis of job performance, Study 8 analyzed a large archival dataset to examine whether astrological sign can predict job performance.

Method

The study was preregistered at https://aspredicted.org/5n6wi.pdf.

Participants. We analyzed archival data from the human resources information system of a large conglomerate in China. Importantly, its job application system does not include any information about the astrological signs of job candidates, thus reducing the possibility of astrological discrimination during job recruitment. At the time of data retrieval, there were 32,878 employees who had both birthdate information and at least one performance score from the last five performance periods (30.1% female; $M_{age} = 31.43$, $SD_{age} = 4.41$; $M_{tenure} = 3.97$ years, $SD_{tenure} = 3.07$). This sample consisted of 29,057 nonmanagerial employees and 3,821 managers distributed in five job functions: technology (48.3%), product (20.4%), marketing (14.9%), design (9.1%), and specialty (7.2%). Their educational backgrounds were: 0.9% high school or below, 5.2% technical/associate degree, 56.1% bachelor's degree, and 37.8% master's degree or above.

Measures.

Astrological sign. As in the previous studies, we coded each participant's astrological sign, astrological element, and astrological gender from his or her birthdate.

Job performance. Twice a year, employees receive an overall job performance score (1 = *lowest*, 5 = *highest*). This performance score is one of the most important metrics that the company uses for employee performance evaluation, end-of-year bonus calculation, and other personnel decisions. To test whether astrological sign predicted job performance, we used two performance measures: (a) the performance score from the most recent period and (b) the average performance score of the past five consecutive periods.

Results

Consistent with Study 7, one-way ANOVAs found that astrological sign did not significantly predict either the performance score from the most recent period ($F = .73$, $p = .71$, Bayes Factor $B_{10} < .001$) or the average performance score of the past five consecutive periods ($F = .42$, $p = .95$, Bayes Factor $B_{10} < .001$). Moreover, the effects of astrological sign remained nonsignificant when we repeated the analyses for (a) each gender, (b) each age group, (c) each educational level, (d) each rank (e.g., managers only), and (e) each job function (all ps $> .05$; all Bayes Factors $B_{10} < .001$). Furthermore, neither astrological element nor astrological gender was significantly predictive of job performance (all ps $> .05$; all Bayes Factors $B_{10} < .001$).

Discussion

Analyzing large-scale archival data from a Chinese company, Study 8 found that astrological sign did not significantly predict job performance, further underscoring the irrationality of astrological discrimination in job recruitment.

General Discussion

Across nine studies using mixed methods (survey, text analysis, experiment, and archival analysis), the present research investigated astrological stereotypes and discrimination in China. Studies 1a, 1b, 2, and 3 found that astrological stereotypes are salient in China (but not in the United States) and were exogenously produced as a result of how the astrological signs were translated into Chinese. In particular, Virgo was found to be the most negatively evaluated sign in China and stereotyped as having disagreeable personalities. Through a field experiment on a popular Chinese dating app, Study 4 demonstrated that Virgos are discriminated against in romantic dating. Moreover, Studies 5 and 6 experimentally demonstrated that Chinese participants—even HR professionals—were less willing to hire a job candidate when the résumé explicitly indicated that the candidate was a Virgo; this effect was explained by the stereotype that Virgos are disagreeable. However, using large samples, Studies 7 and 8 confirmed that astrological stereotypes are inaccurate and astrological discrimination is irrational: Astrological sign did not significantly predict any personality traits or job performance.

Theoretical Contributions

By documenting astrological stereotypes and discrimination in China, the present research offers several important theoretical contributions. First, we advance the understanding of stereotype formation by differentiating between endogenous versus exogenous stereotype formation (see Figure 1). Whereas past research has largely conceptualized stereotypes as emerging endogenously from perceived social reality (Brown & Turner, 2002), we have identified an exogenous process of stereotype formation. Extending the Minimal Group Paradigm, we theorize how arbitrary social categorization *plus* culturally meaningful category cues can exogenously produce stereotypes in society: When arbitrary social categories are introduced, the cultural meanings of category cues (e.g., category names) can be exogenously projected as stereotypes onto those social categories. Whereas endogenous stereotypes may be inaccurate reflections of social reality (because of cognitive and motivational biases), exogenous stereotypes are inherently inaccurate because they are not rooted in social reality at all. Thus, our research contributes to the ongoing debate on stereotype accuracy, and adds nuance to the claim that "stereotype accuracy is one of the largest and most replicable findings in social psychology" (Jussim et al., 2015, p. 490) and the common belief that stereotypes contain "a kernel of truth" (Allport, 1954).

Second and relatedly, we address the chicken-or-egg problem of stereotypes and social reality. This chicken-or-egg problem has been thorny because stereotypes and social reality are mutually reinforcing (Dovidio et al., 2010; Hilton & von Hippel, 1996). By advancing an integrative model of stereotypes and social reality (see Figure 1), we suggest that stereotypes can form exogenously without preexisting social reality and then shape social reality via discrimination. By documenting discrimination on the basis of astrological stereotypes, we provide a real-world demonstration of this theorized process. Hence, the present research modulates the assertion that stereotypes relate to social reality "primarily because they reflect rather than cause social reality" (Jussim, 2017, p. 1).

Third, we contribute to the literatures on culture and globalization. By examining astrological stereotypes and discrimination in China, we highlight the understudied role of culture in stereotyping and discrimination. As a shared meaning system, culture provides the "ground" for groundless stereotypes (Kashima et al., 2007). The cultural meanings of social category cues constitute the cognitive basis for stereotype contents, and the social sharedness of these cultural meanings facilitates the spread of groundless stereotypes. In an era of globalization, cultures increasingly interact with one another (Lu, Hafenbrack, et al., 2017; Morris, Chiu, & Liu, 2015). The assimilation of foreign cultural elements can disrupt the local cultural system, creating new cultural phenomena like astrological stereotyping and discrimination. When foreign cultural elements are introduced, the interactions of the two cultures can spawn new cultural products that did not exist in either culture (e.g., astrological discrimination in *China* based on *Western* astrological signs). In turn, such new cultural products can shape the local culture through their influence on collective actions (e.g., discrimination). By demonstrating that cultural assimilation can accidentally produce stereotypes and discrimination, we extend the growing literature on the downsides of globalization (Heine & Thakur, 2011; Lu, Quoidbach, et al., 2017). While globalization can create new possibilities (e.g., innovations; Lu, Martin, Usova,

& Galinsky, 2019), it can also engender consequential cultural accidents.

Practical Implications

The present research offers meaningful practical implications for individuals, organizations, policymakers, and society. Although astrological signs may be socially connective and entertaining, using them to infer personality traits or make decisions would be irrational. For example, it is unreasonable and unfair to discriminate against Virgos in romantic dating and job recruitment.

Similarly, organizations should be alert to astrological discrimination in the workplace (Kawakami, Dovidio, & van Kamp, 2005). Anecdotal evidence suggests that astrological discrimination is not limited to China. For example, in 2009 an Austrian company was sued for astrological discrimination in job recruitment (*The Daily Mail*, 2009). Remarkably, the company was not ruled at fault, because astrological sign is not a protected class in employment laws. Policymakers should be wary of the popularization of the astrological signs (e.g., the prominent astrology section on major Chinese websites, the automatic listing of astrological signs in dating apps)—otherwise what started as a form of social entertainment may become an iniquitous social divider.

As globalization continues, society needs to be prudent when assimilating elements of foreign cultures. As Study 3 showed, Chinese participants perceived Virgos as more agreeable when translated as "室女" (royal chamber lady) than when translated as "处女" (virgin). Had the former translation been popularized in China, Virgos might have faced less negative stereotyping and discrimination.

Future Directions

Because Western astrological signs were popularized in China only recently (*The New York Times*, 2017), astrological stereotypes are unlikely to have had sufficient time to shape social reality (i.e., personality) to mirror the stereotypes. However, while astrological sign is not predictive of personality currently, it may *become predictive* over time (Glick & Snyder, 1986; Madon et al., 2018). As evidenced by our studies, astrological discrimination is already jeopardizing the opportunities of individuals of certain astrological signs in romantic and professional life. Just as some Chinese parents are less willing to have babies in the Chinese zodiac years of the Sheep (Xu et al., 2020), anecdotes suggest that some Chinese parents are now less willing to have Virgo babies (*Beijing Evening News*, 2013). Thus, it is important for future research to monitor the development of astrological stereotypes and discrimination over time (Martin et al., 2014; Sinclair, Huntsinger, Skorinko, & Hardin, 2005). Given the mutually reinforcing relationship between stereotypes and social reality, it is possible that seemingly accurate stereotypes in society were once inaccurate. As summarized by the Thomas theorem: "If men define situations as real, they are real in their consequences" (Thomas & Thomas, 1928, p. 527).

Conclusion

The present research has uncovered a novel form of stereotyping and discrimination in China based on astrological signs, which were introduced into China from the West. These astrological stereotypes likely originated not from differences among the 12 astrological signs, but from how the astrological signs were translated into Chinese. Whereas past research has largely conceptualized stereotypes as emerging from perceived social reality, these astrological stereotypes suggest that stereotypes can also be exogenously produced without any kernel of truth.

Overall, by leveraging the introduction of Western astrological signs into China as a natural experiment, our research helps disentangle stereotypes from social reality: We provide a real-world demonstration that stereotypes can form without preexisting social reality, yet still produce discrimination that can then shape social reality. In other words, the egg (stereotype) can be born without the chicken (social reality), yet still hatch into the chicken.

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Appendix

The Ten-Item Personality Inventory in Chinese
中文版10项目大五人格量表

Original items (Gosling et al., 2003)	Chinese translations
1. Extraverted, enthusiastic	1. 外向的, 热情的
2. Critical, quarrelsome	2. 挑剔的, 爱争论的
3. Dependable, self-disciplined	3. 可靠的, 自律的
4. Anxious, easily upset	4. 焦虑的, 易心烦的
5. Open to new experiences, complex	5. 愿意接触新事物的, 思维复杂的
6. Reserved, quiet	6. 内敛的, 安静的
7. Sympathetic, warm	7. 有同情心的, 温暖的
8. Disorganized, careless	8. 缺乏条理的, 粗心的
9. Calm, emotionally stable	9. 冷静的, 情绪稳定的
10. Conventional, uncreative	10. 循规蹈矩的, 缺乏创造性的

Note. Scale scoring ("R" denotes reverse-scored items): Extraversion: 1, 6R; Agreeableness: 2R, 7; Conscientiousness: 3, 8R; Emotional Stability: 4R, 9; Openness to Experiences: 5, 10R.

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