Social Exploration: When People Deviate from Options Explored by Others

Yuji K. Winet[1], Yanping Tu[2], Shoham Choshen-Hillel[3], and Ayelet Fishbach[1*]

[1] University of Chicago

[2] University of Florida

[3] The Hebrew University of Jerusalem

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All materials and data are publicly archived on OSF: https://osf.io/zps5x/. Correspondence concerning this article should be addressed to Yuji K. Winet, Booth School of Business, University of Chicago, 5807 S Woodlawn Ave, Chicago, IL 60637, Chicago, IL 60637. E-mail: yuji.winet@chicagobooth.edu. Yuji K. Winet and Yanping Tu contributed equally.

People often face choices between known options and unknown ones. Our research documents a social-exploration effect: People are more likely to explore unknown options when they learn about known options from other people's experiences. Across four studies (N = 2,333), we used an incentive-compatible paradigm where participants chose between known and unknown options (e.g., cash bonuses). We found higher exploration rates (i.e., choosing of unknown options) when information about known options came from other people, compared with an unidentified source (Study 1a) or a computer (Studies 1b-4). We theorize that the social-exploration effect results from people's tendency to intuitively adopt a group-level perspective with other people: a "we"-perspective. Thus, in social contexts, people explore more to diversify their experience as a group. Supporting this account, we find the effect attenuates in exploration of losses, where people do not wish to adopt a group-level perspective of others' losses (Study 2). Furthermore, the effect is obtained only if others have experienced the outcome; not when they only revealed its content (Study 3). Finally, the social-exploration effect generalizes to everyday choices, such as choosing a movie to watch (Study 4). Taken together, these findings highlight the social aspect of individual exploration decisions and offer practical implications for how to encourage exploration.

Keywords: exploration, decision making, social influence, we-perspective.

On your next night out, will you choose a restaurant you have heard of before or will you explore a new and unknown one? And if watching a movie instead, will you choose a movie a colleague or a website had mentioned, or explore one you have not yet heard of? Individuals often face decisions between capitalizing on options they know something about and exploring options that they know nothing about. Choosing known options means having a reliable and predictable experience, but choosing unknown options makes no such guarantees. Unknown options offer novelty and the potential to provide an even better experience than a known option while also carrying the risk of providing a worse one.

This research asks whether the information source matters for exploration. Holding constant the information about known options, we hypothesize that emphasizing that this information was obtained from social sources (i.e., other people's experiences) increases the motivation to explore as compared to no such mentioning. We dub this the *social-exploration effect*. We posit that this effect is driven by an intuitive tendency to take a group-level perspective (or "we"-perspective) when exploring an environment with others, even when no group membership is made explicit. This we-perspective makes people gravitate towards exploring new options to diversify their experiences as a group.

Exploration Behavior

What drives individuals to explore their environment? Whether a hummingbird chooses to keep drinking nectar from a flower or move to a new one, or whether a stock trader decides to keep her money invested in a particular stock or invest in a new one, exploration decisions may appear relatively simple. And yet, these choices represent complex tradeoffs between the benefits of certainty and the costs of uncertainty (Krebs, Kacelnik, & Taylor, 1978; Lee, Zhang, Munro, & Steyvers, 2011). Three main categories of factors have been found to influence the tendency to explore (Melhorn et al., 2015). The first category includes environmental factors, such as the variation of the options (Cohen, McClure, & Yu, 2007; Lejarraga, Hertwig, & Gonzalez, 2012), the prevalence of rewards (Teodorescu & Erev, 2014a), and the number of decisions one expects to make (Wilson, Geana, White, Ludvig, & Cohen, 2014). A second category includes individual factors (Teodorescu & Erev, 2014b), such as the tendency to maximize (vs. satisfice; Schwartz et al., 2004), the desire for novelty (Hirschman, 1980), the desire for variety (Kahn, 1995) and curiosity (Golman, Loewenstein, Molnar, & Saccardo. 2019; Hsee & Ruan, 2016; Loewenstein,

1994). Most relevant to the current research is the third category: social factors that influence exploration.

Though relatively little research has examined social factors in exploration decisions, the influence of others in exploration is pervasive. Social influence may depend on the relationships with others, which vary between competitive, collaborative and neutral. In competitive contexts, multiple parties vie for the same resources, which increases the costs of exploration and thus inhibits it. For example, players in a competitive sampling game spend less time sampling balls from different urns before making a final choice, so they explore fewer possible payouts. Learning that another player can choose an urn and thus remove it from the choice set reduces exploration compared with choosing alone (Phillips, Hertwig, Kareev, & Avrahami, 2014). In collaborative contexts, multiple parties use group-level exploration strategies like role specialization, where different subdivisions of a group separately pursue exploration and exploitation to optimize group outcomes. For example, many bird species naturally organize themselves into subgroups of "producers" who explore new food sources and "scroungers," who secure those findings (Giraldeau & Lefebvre, 1986). Similarly, human organizations designate certain subgroups to experiment with novel tactics and simultaneously designate others to leverage existing ones (Gupta, Smith, & Shalley, 2006).

Intuitive We-Perspective

People tend to use the word "we" when referring to others. Authors use the author's "we" as ambassadors of collective wisdom, doctors use "we" when referring to their patients (e.g., "How are we feeling today?" means "How are you feeling today?"), and waiters use the "royal" we when asking, "What are we in the mood for?" This tendency entails adopting an inclusive perspective that incorporates social others into one's own group by switching from a me-perspective (or "me-and-you"-perspective) to a we-perspective (Agnew, Van Lange, Rusbult, & Langston, 1998; Fitzsimons & Kay, 2004). This tendency is driven by an inherent motivation to share psychological states with others, which serves the adaptive purpose of facilitating coordination among group members (Tomasello, Carpenter, Call, Behne, & Moll, 2005; Tu & Fishbach, 2015; Tu, Shaw & Fishbach, 2016).

A we-perspective is similar to vicarious experience. Vicarious experience happens, for example, when merely watching a spider crawl on a stranger's body makes people shiver (Keysers et al., 2004), and when observing a stranger receive painful pinpricks activates the

same pain-related brain regions as receiving pinpricks for oneself (Morrison, Lloyd, Di Pellegrino, & Roberts, 2004). Like vicarious experience, a we-perspective implies that people spontaneously expand their perspectives to integrate other people's experiences with their own. Yet, rather than seeing their own and others' experiences as identical, when adopting a we-perspective, individuals perceive both sets of experiences as components of a collective, group-level whole. For example, football fans use phrases like "we won" and "we got beat" after merely watching the victories or defeats of their team and do so more, in fact, in victory than defeat (i.e., "cutting off reflected failure"; Snyder, Lassegard, & Ford, 1986). Similarly, Americans who have never left Earth regularly claim "we landed on the moon" ever since Neil Armstrong and his team stepped foot there (Lepore, 2019).

Specifically, a we-perspective does not imply confusion between one's own and other people's personal experiences (i.e., "inclusion of other in the self"; Aron, Aron, & Smollan, 1992; Aron, Aron, Tudor, & Nelson, 1991). For example, at no point do Americans misremember themselves as stepping foot on the moon. Instead, a we-perspective allows people to recognize and take into account differences between group members' individual experiences to coordinate their behavior in complementary ways for the sake of the collective. That is, a we-perspective supports the pursuit of shared goals by effectively dividing labor within a group. For example, romantic couples spontaneously divide responsibilities by assigning one partner to manage finances on behalf of the couple (Ward & Lynch, 2018; see also Wegner, Raymond, & Erber, 1991).

While most of the evidence on we-perspective is in regard to close relationships, sharing others' experiences at a group level does not require interpersonal connections or even apriori group associations. On the other hand, people are not likely to grant all social beings the in-group status necessary for group-level perspective-taking. When individuals are motivated not to affiliate with a given social other, such as when this person is known to be an out-group member, one should not expect a we-perspective. Thus, while taking a we-perspective is not limited to close relationships and extends to social groups of all sizes and degrees of familiarity, is not extended to disliked others.

The Social-Exploration Effect

The tendency to treat others, even strangers, as part of one's group and switch to a we-perspective may have implications for exploration decisions that individuals make for

themselves. Specifically, a we-perspective may make the options that have not been experienced by others seem like opportunities to provide beneficial diversity to one's experience "as a group." In contrast, options that have been experienced by others may seem redundant for the group experience. Importantly, a given choice option can seem redundant at the group level because someone else tried it, but non-redundant at the individual level because it is still novel to the individual.

Typically, people value diversity in outcomes (Choi, Kim, Choi, & Yi, 2006). Variety seeking can occur for a number of interconnected reasons, such as to seek stimulation, to avoid repetition, to satisfy curiosity and to slow hedonic adaptation (Fishbach, Ratner, & Zhang, 2011; Hirschman, 1980; Kahn, 1995; McAlister & Pessemier, 1982; O'Brien, 2019; Raju, 1980; Ratner, Kahn, & Kahneman, 1999; Read & Loewenstein, 1995; Sheldon, Boehm, & Lyubomirsky, 2013; Simonson, 1990). While the tendency to explore is multidetermined, the social-exploration effect specifically refers to exploration that is driven by the social source of information. It predicts that people will explore more when the information comes from a social or more socially-salient source (e.g., other people), as opposed to a nonsocial or less socially-salient source (e.g., computers). For example, consider a person reading an article about another person's experience traveling to an exciting destination. Certainly, merely reading this article will elicit a desire to travel there; independently, the social-exploration effect would predict that the same article would encourage more exploration of alternative travel destinations when the author is clearly a social entity (e.g., "I give this destination a rating of 5/5 stars") as opposed to a nonsocial entity (e.g., "This website gives this destination a rating of 5/5 stars").

Stated formally, our main prediction is that *when information about a known option comes from another person, people will be more likely to explore unknown options than when the information source is not mentioned or is not social.* We posit that, because information from social sources increases awareness of those sources' experiences, people will be more inclined to seek out alternative experiences for themselves than when information comes from nonsocial sources (e.g., mere information, computers, etc.).

Our next predictions stem from the hypothesis that a we-perspective underlies the social-exploration effect. We predict that *the social-exploration effect will attenuate in the loss (vs. gain) domain.* While people are motivated to adopt a we-perspective to share in other people's positive experiences (i.e., to "bask in reflected glory"; Cialdini et al., 1976), they are also

motivated to protect themselves from negative experiences and will thus avoid sharing in others' losses (i.e., to "cut off reflected failure"; Snyder et al. 1986). In our experimental context, people should therefore be less likely to adopt a we-perspective in the loss domain than in the gain domain, which will cause the social-exploration effect to attenuate for losses.

Our third prediction is that *the social-exploration effect should attenuate when the social source does not experience the outcomes associated with the information they provide.* Choices and their associated outcomes are separable. While some choices lead to their intended outcomes, others lead to unintended ones (e.g., purchasing a product only to find out it is not in stock or voting for a political candidate who does not win their election) or even to no outcomes at all (e.g., hypothetical choices). Consequently, individuals respond to choices and experienced outcomes in distinct ways. For example, individuals diverge less from others' product choices (i.e., stated preferences) than others' product experiences (i.e., purchases; Tu & Fishbach, 2015). The we-perspective account suggests that people explore in order to diversify their experiences as a group and thus avoid repeating others' individual experiences. It follows that, if the information source makes a choice but does not have a corresponding experience to share, people should not be more inclined to explore than if they received mere information alone (e.g., from a website, a book).

Correspondingly, if the information source was assigned to experience a certain option, which they did not choose, people should be more inclined to explore other options than if they received the same information from a nonsocial source (i.e., the social-exploration effect will hold). This comparison helps separate our model from uniqueness seeking. Indeed, another reason people might choose differently is to express their unique identity. While people generally conform to others' choices (Surowiecki, 2005), at times they purposely deviate to express themselves as unique individuals (Ariely & Levav, 2000; Berger & Heath, 2007; Tian, Bearden, & Hunter, 2001). This tendency to choose differently as a form of identity signaling is more likely when choices are public and when they involve expressions of personal taste. Accordingly, we test the social-exploration effect in private choices using monetary rewards (and further discuss their diverging predictions in the General Discussion). We further predict that people will deviate more from others' experiences but not from their choices which were not followed by experiences, although deviating from both similarly conveys unique identities.

The Present Research

To test the social-exploration hypothesis, we developed a treasure-hunt paradigm (used in all studies except Study 4). This minimalistic and incentive-compatible computerized paradigm involves choosing one out of four treasure sites, each containing an unknown monetary reward within a given range (e.g., between 1 and 40 cents). The amount of monetary reward in each site is fixed and unknown. Before making their selection, participants learn the contents of a single site (e.g., Site B always returns 20 cents). They then decide whether to choose this known site (in which case, they would earn 20 cents) or explore another site with an unknown amount. Critical to our main hypothesis, this paradigm allows us to manipulate participants' awareness that information about a known site either comes from another person or from a mere information source. In the social-information condition, the information source is always another participant who chose that site and received the associated reward. In the mere-information condition, the information source is either not mentioned or is a computer simulation that randomly reveals a site.

In the interest of capturing *social* exploration, we designed the treasure-hunt paradigm to provide a context in which exploration is attractive to some extent, so we can test whether it is even more attractive in social contexts. We incorporated several elements to this end. First, we instilled curiosity about the contents of unknown sites by presenting them as rewards. Second, we reminded choosers of the unexplored options; we presented clear exploration opportunities alongside clear exploitation opportunities. Third, we reduced participants' social pressure to conform and controlled for beliefs that social others seek information from them or derive hedonic utility from their choices. We did this by ensuring anonymity, by restricting communications between participants and information sources, and by making clear that participants' outcomes were independent from information sources' outcomes.

We designed our minimalistic paradigm to simulate realistic group exploration contexts. In such contexts, individuals often explore the environment with others who are neither explicitly similar nor dissimilar to themselves; they merely share a common goal of exploring some environment (e.g., exploring a specific product category with anonymous consumers). Classic work on the minimal group paradigm suggests that people readily form groups with individuals who are only tentatively connected to them (Tajfel, Billig, Bundy & Flament, 1971). Testing our hypothesis in a minimalistic context allowed us to leverage the tendency to form minimal groups

(in this case with individuals who merely share an exploration task) and manipulate only the key variable—sociality—while holding all other qualities of the information sources constant.

In what follows, we report four studies, which are summarized in Table 1. Across these studies, we targeted a minimum sample of 50 participants per experimental condition. We anticipated that we would find medium-to-large effects[1]. Power analyses conducted in G*Power (Faul, Erdfelder, Lang, & Buchner, 2007) based on respective sample sizes and target alpha level (α = .05) revealed that power was sufficient across all studies (i.e., ≥ .80) to detect a medium-to-large effect. The studies in this paper incorporate online participants recruited from Amazon Mechanical Turk (MTurk), Prolific and various universities in China. All materials and data are publicly archived (https://osf.io/zps5x/).

Study 1a: The Social-Exploration Effect

Study 1 tested the social-exploration effect. Participants played an incentive-compatible, computerized treasure-hunt game in which they had to choose one of four "treasure sites," each containing a monetary reward. They learned that the amount offered by each site varied between 1 and 40 cents. They further learned about the amount in one of the sites: between 5 and 35 cents in increments of 5 cents (seven conditions). In the social-information condition, participants learned that information about the known site came from a previous player; the mere-information condition did not mention the information provider. We predicted that more participants would choose one of the three unknown sites (i.e., explore) in the social- than in the mere-information condition, regardless of the size of the known amount.

Method

Participants. We opened the experiment to 420 U.S.-based participants on MTurk in return for a $0.30 fixed payment plus a variable performance-based bonus. In this and all subsequent MTurk studies, participants were invited to participate as long as their approval rating was at or above 95%. MTurk returned 427 responses (M_{age} = 36.58, SD = 12.76, 54% women; one participant reported "four" and was excluded from calculating age mean). We report participant attrition in all studies in the SOM (Zhou & Fishbach, 2016).

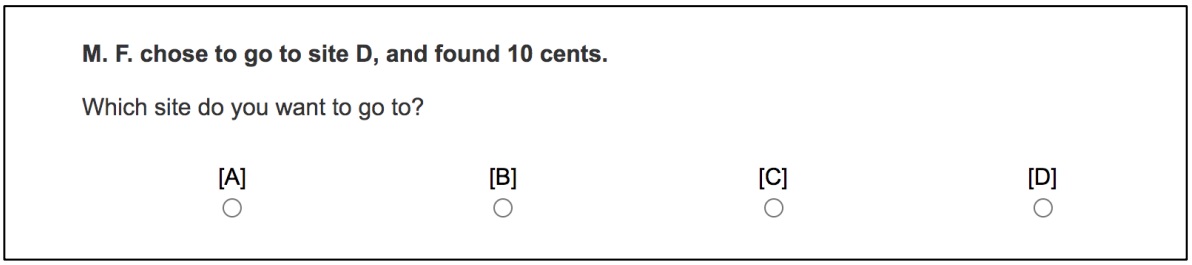
[1] We calculated an estimate of effect size using the two revealed monetary amount conditions in Study 1 (i.e., 20 and 25 cents) that are used in subsequent studies. This yielded a medium-to-large effect (d = 0.76).

Procedure. This study used a 2 (social information vs. mere information) between-participants design. We also manipulated the reward offered by the known site (5, 10, 15, 20, 25, 30, and 35 cents) between-participants for conceptual replication with a decreasing incentive to explore. Participants read that they would play a treasure-hunt game in which they would choose one of four available sites: Site A, B, C, or D (represented as four boxes on the screen). Each site contained some unknown amount between 1 and 40 cents that they would receive as a bonus. They next answered a series of comprehension questions about the game and could proceed only after answering correctly.

Participants in the mere-information conditions then read, "It is known that site D provides 5 [10] [15] [20] [25] [30] or [35] cents. Which site do you want to go to?" In the social-information conditions, participants read, "Our computer program has paired you up with another participant, M. F., who will be your treasure hunting partner, while you were reading the game instructions. M. F. will choose a site to visit first. When (s)he returns, we will inform you of what (s)he finds. You will choose a site to visit next. When you return, we will inform M. F. of what you find. M. F. will receive the money (s)he finds as a bonus; you will receive the money you find as a bonus. That is, the two of you will not share the money." Next, participants saw a waiting screen while M. F. ostensibly made their selection. After 14 seconds, participants read, "M. F. chose to go to site D, and found 5 [10] [15] [20] [25] [30] or [35] cents. Which site do you want to go to?" (see Figure 1). Notably, participants were assured that the amount in each site remained constant, meaning each time the site was selected, the same amount would be earned.

Figure 1

An example choice presented to participants in the social information condition in Study 1.



Next, if participants chose the known site, they earned the corresponding amount in their revealed amount condition; if they chose a different site (i.e., explored), they earned 8 cents. As

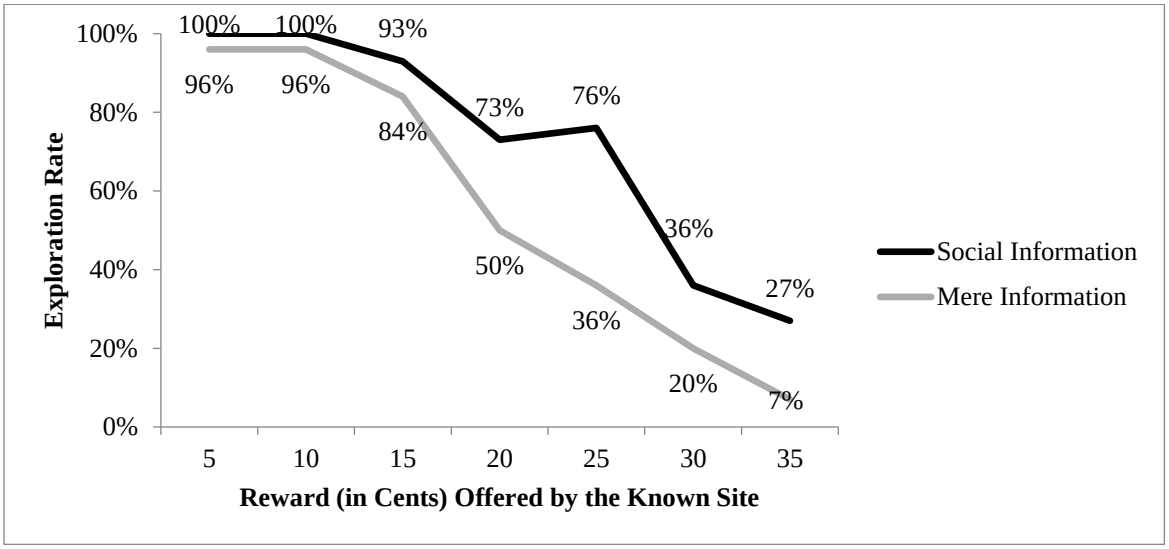
an attention check, participants next reported whether the site they chose was the same or different from the known site and reported the amount they received. We also asked participants to reflect on the rationale of their choice ("What are the reasons that underlie your treasure site choice?").

Results and Discussion

Our dependent variable was whether participants explored an unknown site. In support of the hypothesis, across reward amounts, participants were more likely to explore an unknown site in the social-information (153/213, 72%) than in the mere-information conditions (118/214, 55%), $\chi^2(1, N = 427) = 12.83$, $p < .001$ (see Figure 2). The odds ratio was 2.08 (see Table 1), suggesting a small-to-medium effect size across all seven levels of known rewards.

Figure 2

Exploration rate as a function of information source and known reward amounts



Note. Participants in Study 1a explored an unknown site more often after learning the reward offered by a known site from a person than from mere information, regardless of the amount of reward offered.

For exploratory purposes, we analyzed the effect of the reward amount revealed in the known site. We conducted a logistic regression with exploration as the dependent variable and information source, revealed reward amount (ordinal variable) and their interaction term as predictors. This analysis did not reveal a significant interaction between revealed reward amount and information source, $\beta = -0.03$, $SE = 0.04$, $Wald(1) = 0.57$, $p = .449$, odds ratio = 0.97. It yielded a main effect: The exploration rate decreased as the known reward increased, $\beta = -0.18$,

SE = 0.03, *Wald*(1) = 47.38, $p < .001$, odds ratio = 0.83. This finding is to be expected because larger rewards are closer to the optimal outcome and thus decrease the potential benefits of further exploration (i.e., the satisficing principle; Simon, 1956).

Responses to the open-ended rationale question mainly fell into four categories (see Table 3 in the SOM), the most common of which was, "desire to maximize earnings" (147/650, 23%)[2]. Only 16 participants in the social-information condition mentioned reasons related to taking a we-perspective (16/315 or 5%). These results suggest that people are largely unaware of the we-perspective mechanism.

Results from Study 1 support the social-exploration hypothesis: Participants explored more when they were made aware that the information source was a person. Our theory posits that the tendency to adopt a we-perspective with other people underlies the effect, yet several alternative explanations are possible. First, the information in the mere-information condition may have appeared to be a recommendation by the experimenter, which could have encouraged participants to choose the known option more often. To eliminate this possibility, we adapted the mere-information condition in all subsequent studies, unless otherwise noted, to have a computer simulation ostensibly select the known option at random. Another possible explanation for the effect is that participants were trying to reciprocate the previous player by collecting new information to share with them. We tested this possibility by making participants' decision private and unknown to the previous player in subsequent Studies 2–4, thus eliminating the possibility to reciprocate information. In these subsequent studies, we also remove the information that the previous player explored, leaving it possible that that person did not explore. We find no evidence that it matters whether participants expected to reciprocate information or thought the first person explored.

Study 1b: Generalizing to a Payout-Maximizing Frame

The experimental setting in Study 1a was explicitly referred to as a game, which might have encouraged participants to take a more "playful" approach than they would have if they were trying to maximize their earnings, potentially more so in the social-information condition. Study 1b tested whether the social-exploration effect would generalize to a non-game context that emphasized earning as much money as possible. We used a similar paradigm as in Study 1a,

[2] Here and in subsequent studies, the total number of responses exceeds the total number of participants because some participants listed multiple reasons for their choice.

except we manipulated the framing of the task, describing it either as a "treasure-hunt game" (as in Study 1a) or as a "financial task" involving investment opportunities. The financial-framing instructions emphasized that the participant's goal was to maximize their earnings. We expected to replicate the social-exploration effect in the financial-decision conditions.

Method

Participants. We opened 240 HITs to predominantly U.S.-based participants on MTurk and provided a $0.20 fixed payment plus a variable performance-based bonus. MTurk collected 251 responses (M_{age} = 37.34, *SD* = 11.36, 56% women; one person did not report their age).

Procedure. This study used a 2 (social information vs. mere information) × 2 (task framing: treasure-hunt game vs. financial-decision task) between-participants design. Based on the results of Study 1a, we revealed either 20 cents or 25 cents, between-participants. We used these different amounts as a conceptual replication. We report the data after collapsing across these amounts.

The basic procedure was similar to Study 1a. To manipulate game framing, participants in the treasure-hunt-game conditions read, *"*This is an exploration game, which allows you to discover prizes in a new environment. There are multiple treasure sites, each containing a unique reward. Consider how you might select among your potential options to pick the most satisfying outcome." Participants in the financial-decision-task conditions read, "In this task, you will make a financial decision that will lead to actual payment. Consider how you use financial information in the real world to accumulate money. Think about how to make the best judgments and decisions to earn the most worthwhile payout." To further emphasize the game versus task nature of the decision, we used the following terms throughout the study: "treasure hunting" ["financial decision making"], "sites" ["investment opportunities" (or just "investments")], "finding" ["earning"], "going to" ["investing in"], and the "game" ["task"], respectively.

In the social-information conditions, participants received information about one site ostensibly based on what another participant found (as in Study 1a). In the mere-information conditions, participants learned the ostensible result of a real-time computer simulation, which allowed both conditions to be equally dynamic while preserving differences in perceived sociality. Across all conditions, participants waited a few seconds to learn the rewards provided by a single site (20 or 25 cents). Then, participants chose a site for themselves. If they chose the

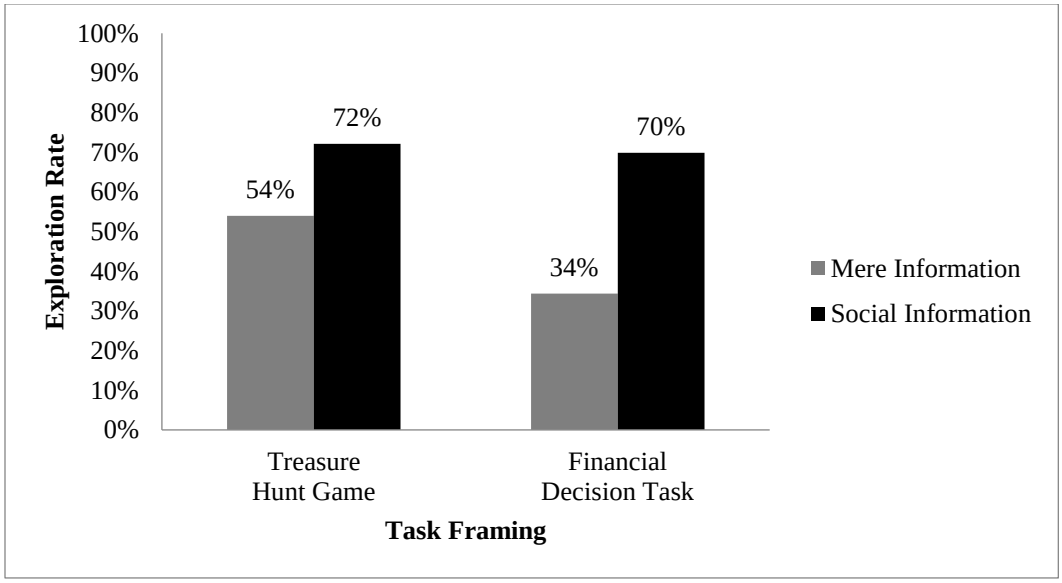
known site, they earned the corresponding amount in their condition; if they chose a different site, they earned 23 cents.

Results and Discussion

Our dependent variable was exploration rate: whether participants explored an unknown site or not. In support of the social-exploration hypothesis, participants were more likely to explore in the social-information (88/124, 71%) than in the mere-information conditions (56/127, 44%), $\chi^2(1, N = 251) = 18.53$, $p < .001$ (see Figure 3). The odds ratio was 3.10, suggesting a medium-to-large effect size.

Figure 3

Exploration rate as a function of information source and task framing



Note. Participants in Study 1b explored unknown sites more when the information source of a known option was a person (the social-information condition) than when it was a computer simulation (the mere-information condition) regardless of whether the decision was described as a treasure-hunt game or a financial-decision task.

We also found a marginal effect of task framing: The exploration rate was marginally lower in the financial-decision-task-framing conditions (66/127, 52%) than in the treasure-hunt-game-framing conditions (78/124, 63%), $\chi^2(1, N = 251) = 3.07$, $p = .08$; odds ratio = 1.57. This pattern is reasonable given that activating the goal of maximizing earnings may decrease risk tolerance and exploration involves inherently higher risk than not exploring.

We found no evidence that task framing moderated the social-exploration effect. A logistic regression with exploration as the dependent variable and information source, task

framing and the interaction of these two terms as the independent variables did not yield a significant interaction, $\beta = 0.69$, $SE = 0.54$, $Wald(1) = 1.66$, $p = .197$. Instead, we found the social-exploration effect within each task-framing condition: for the treasure-hunt game (mere information: 34/63, 54% vs. social information: 44/61, 72%), $\chi^2(1, N = 124) = 4.38$, $p = .036$; odds ratio = 2.21; for the financial-decision task (mere information: 22/64, 34% vs. social information: 44/63, 70%), $\chi^2(1, N = 127) = 16.00$, $p < .001$; odds ratio = 4.42.

Taken together, these results suggest that our participants were not exploring more in social contexts because they felt encouraged to treat their choice as a game, prioritizing enjoyment over earnings.

Study 1c: Replicating the Social-Exploration Effect in China

Studies 1a and 1b were run using predominantly U.S. samples and thus established the social-exploration effect in an individualistic population where people tend to value personal freedom and independence from group pressures, relative to collectivistic populations as in East Asian cultures where people tend to value interdependence and group harmony (Kim & Markus, 1999). The purpose of Study 1c was to explore the generalizability of the effect in a more collectivistic population, specifically, in China.

Method

Participants. We published the study to a pool of registered participants from multiple universities in China in return for a 1 RMB (14 cents) fixed payment plus a variable performance-based bonus. We pre-determined the sample size to be at least 200 participants. We posted the study for 1 day and returned 264 participants (70% women; age information was not collected).

Procedure. This study used a similar experimental setup as Study 1a, except that payment was in Yuan. Participants learned that the rewards in the sites could vary between 0.1–2.8 RMB (approximately 1–40 cents), and we sampled stimuli by randomly assigning revealed amounts to be either 1.75 RMB (25 cents) or 2.1 RMB (30 cents) between-participants. We report the data after collapsing across these amounts.

Results and Discussion

Our dependent variable was exploration rate. In support of the social-exploration hypothesis, participants were more likely to explore in the social-information condition (48/135,

36%) than in the mere-information condition (17/129, 13%), $\chi^2(1, N = 264) = 17.80$, $p < .001$. The odds ratio was 3.64, suggesting a medium-to-large effect size.

We also asked participants to explain the reasons for their choice with an open-ended text response. Responses to the open-ended rationale question mainly fell into 7 categories, the most common of which was that participants, "considered the known amount" (137/475, 29%). Only 16 participants mentioned reasons related to the influence of the teammate (16/264, 6%; see Table 4 in the SOM). This, like the open responses in Study 1a, suggests that people are largely unaware of the we-perspective mechanism.

The results of this study replicate the social-exploration effect among a Chinese sample, suggesting that the effect also exists among more collectivistic cultures. While there are lower absolute levels of exploration among the Chinese sample compared with the U.S. sample in Study 1b (possibly because we revealed somewhat larger monetary rewards), the effect size of the social-exploration effect was, in fact, larger in Study 1c.

Study 2: Moderation by Loss Frame

To investigate whether group-level perspective-taking underlies the social-exploration effect, in Study 2, we introduced a condition in which people made choices in the loss domain. We hypothesized that the social-exploration effect would attenuate within the loss domain. Because people are less likely to adopt a we-perspective with "losers" (i.e., to "cut off reflected failure"; Snyder et al., 1986), participants would explore more in social- than in mere-information contexts when the options represent gains, but would not when they represent losses. Before reporting the main study, we report a pretest in which we explored whether, within our paradigm, people are more inclined to switch to a we-perspective in the domain of gains than losses.

Pretest: More We-Perspective-Taking for Gains than Losses

To test whether people see others' gains as collective gains more than they see others' losses as collective losses, we conducted a pretest using a 2-condition (framing: gain vs. loss) between-participants design within the social condition. We opened 100 HITs to predominantly U.S.-based participants on MTurk and provided a $0.20 fixed payment plus a variable performance-based bonus. MTurk collected 100 responses (M_{age} = 35.56, SD = 10.21; 35% women).

We used a similar paradigm as Study 1a, except that in the loss condition, participants were given an endowment of 120 cents and instead of choosing among four "treasure" sites, they chose among "land mine" sites that would cause them to lose instead of gain money. Also, participants did not read that their choice would be shared with the first player.

Sites earned [lost] between 1 and 119 cents. All participants played the game ostensibly with another player ("M. F.") who also gained [lost] money from their choice. As in the previous studies, participants learned about the contents of a site from the other player's choice. To make the experience more vivid, we presented colorful, relevant background images (green dollar bills or burning dollar bills), a visual aid (a pie chart depicting the known site's contents relative to total possible earnings) and sound (applause or a siren, which we verified participants could hear).

The revealed amount in the gain condition was 60, 66 or 75 cents (randomly determined) and in the loss condition was 24, 30 or 36 cents (randomly determined). Because experiences of losses are generally 2-2.5 times more intense than experiences of gains (Tversky & Kahneman, 1991), we chose these loss amounts to match the intensity of the gain experiences.

Crucially, upon learning about the other player's gain [loss], participants indicated whether they agreed with a statement about group-level perspective-taking, adapted from Cialdini et al. (1976): "M. F.'s earning/losing [××] cents feels like a gain/loss for M. F. and me as a team" (1 = *completely disagree*, 7 = *completely agree*). To echo the cover story, participants also made a choice for themselves afterwards. Participants' choices were not analyzed.

Supporting our hypothesis, participants more readily adopted a we-perspective when the other player gained money (M = 4.17, SD = 1.81) than when they lost money (M = 3.06, SD = 1.88), $t(98) = 2.99$, $p = .003$; Cohen's $d = 0.60$.

We then conducted the main study, which used a similar procedure, except that we further manipulated the information source (social information vs. mere information) and did not have participants answer the group-perspective question (which would not be applicable in the mere-information condition). Participants played three rounds of the game. We predicted that the social-exploration effect would be larger in the gain- than in the loss-framing condition.

Method

Participants. We opened 200 HITs to predominantly U.S.-based participants on MTurk and provided a $0.20 fixed payment plus a variable performance-based bonus. MTurk returned 202 responses (M_{age} = 37.48, *SD* = 11.11, 55% women).

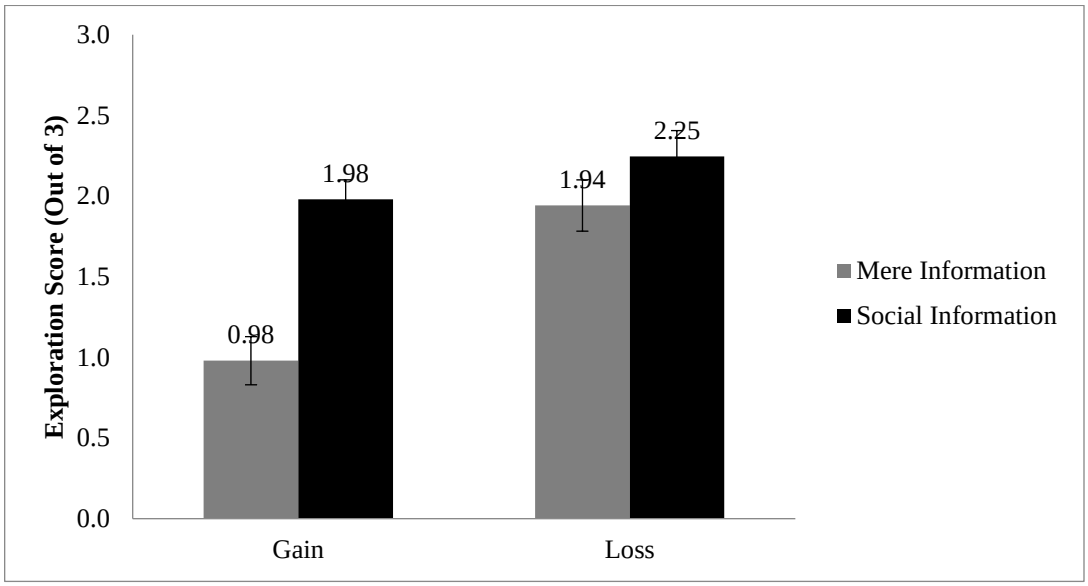
Procedure. This study used a 2 (source: social information vs. mere information) × 2 (framing: gain vs. loss) between-participants design. We used a procedure similar to the one in the pretest, except that (1) in the mere-information conditions, participants learned information from a computer simulation, (2) participants did not answer the group-perspective-taking question, and (3) participants learned they would play three independent rounds of the game in which the site contents would change in each round and their payment would be determined by one of their choices at the end. The order of the revealed amounts (60, 66, or 75 cents in the gain conditions; 24, 30, or 36 in the loss conditions) was counterbalanced across rounds. Before starting the game, participants in the social-information conditions learned that the other player was randomly assigned to choose first in all three rounds. We report the data after collapsing across these amounts.

Results and Discussion

We calculated participants' exploration score as the number of times they chose an unknown site across the three rounds (between zero and three). In support of our hypothesis, a 2 (source: social information vs. mere information) × 2 (frame: gain vs. loss) ANOVA yielded an interaction effect, $F(1,198) = 5.60$, $p = .019$, $\eta_p^2 = 0.03$ (see Figure 4). Within the gain frame, participants explored more in the social-information (M = 1.98, SD = 1.13) than in the mere-information condition (M = 0.98, SD = 1.10), $F(1,198) = 22.43$, $p < .001$; $\eta_p^2 = 0.10$ (the social-exploration effect). Within the loss frame, however, exploration was similar in the social-information (M = 2.25, SD = 0.88) and mere-information (M = 1.94, SD = 1.07) conditions, $F(1,198) = 2.20$, $p = .140$, $\eta_p^2 = 0.01$.

Figure 4

Exploration score as a function of information source and gain/loss frame



Note. Participants in Study 2 explored more in the social-information than in the mere-information condition, but only in the gain domain. The social-exploration effect was attenuated in the loss domain. (Error bars represent +/-1 standard error.)

This analysis also yielded a main effect of information source, $F(1,198) = 19.63$, $p < .001$, $\eta_p^2 = 0.09$, such that participants chose to explore more in the social-information ($M = 2.12$, $SD = 1.01$) than in the mere-information conditions ($M = 1.47$, $SD = 1.18$). In addition, we found a main effect of framing, $F(1,198) = 17.36$, $p < .001$, $\eta_p^2 = 0.08$, whereby participants chose to explore more when options were framed as losses ($M = 2.10$, $SD = 0.98$) than gains ($M = 1.49$, $SD = 1.22$). This main effect is consistent with the general tendency to seek more risk in loss than gain domains (Kahneman & Tversky, 1979), although, given the amounts that could be earned from revealed sites differed for gain- and loss-framing conditions, it should be interpreted with caution. Further, given this main effect, we cannot draw conclusions from comparisons between the mere-information conditions, or between the social-information conditions. We therefore limit our hypothesis testing and conclusions to comparisons within each frame, which confirm the social-exploration effect only for gains.

The results of Study 2 are consistent with the proposed group-level perspective-taking account of the social-exploration effect. First, we found in the pretest that it is more intuitive to

people to consider others' gains as the group's gain than to consider others' losses as the group's losses. Second, the effect was replicated in the gain domain. In the loss domain, where people are less likely to intuit the other person's outcomes as a collective outcome, the effect was attenuated. Additionally, across studies, we varied the number of (independent) rounds participants played (See Table 2 in the SOM). In doing so, we gathered evidence for the generalizability of the social-exploration effect.

Study 3: Social Exploration in Response to Others' Realized Outcomes

We predict that people are more likely to explore in social settings because they want to diversify their experience as a group rather than repeat a group member's *experience.* Two hypotheses follow. First, if the other person only made a *choice*—but did not experience its corresponding outcome—then people who observe this choice should not explore more than people who receive the information from a mere information source (i.e., because their group had not experienced this option yet, they ought to still try it out). Second, if the other person only experienced the outcome—but did not choose it—then people who observe this should explore more than people who receive the information from a mere information source (i.e., because an option had already been experienced by the group, they ought to choose a different option). Together, if these hypotheses are confirmed, we can conclude that people explore more in social situations not because they are trying to make different *choices* than others (e.g., to signal their uniqueness), but because they are trying to have new experiences at the group level.

To test the first hypothesis, in Study 3 we created a new "choice-without-experience" social condition, where the other player revealed the contents of a treasure site without being able to earn anything from it (i.e., without experiencing the outcome). We predict that in this condition, exploration rates should be lower than in the standard social-information condition (and more similar to the mere-information condition).

To test the second hypothesis, in Study 3 we added the "experience-without-choice" social condition. Here, the other player was randomly assigned a treasure site and could not choose for themselves. The other player did, however, obtain the reward from that site. Thus, we predict that in this condition, exploration rates should be higher than in the mere-information condition (and similar to the social-information condition) because participants will want to experience a new option.

Yet, before reporting the main study, we report another pretest. This pretest explored whether people are more inclined to switch to a we-perspective in a social context than a mere-information context.

Pretest: More We-Perspective-Taking When Receiving Information from a Person

To test whether people are more inclined to adopt a group-level perspective when receiving information from another person versus a computer simulation, we first ran a pretest using a 2-condition (mere information vs. social information) within-participants design.

We opened the survey to 80 predominantly U.S.- and U.K-based participants on Prolific and provided a £0.40 (equivalent to 50 cents) fixed payment. Prolific returned 81 participants (M_{age} = 30.64, *SD* = 9.09; 48% women). Participants read a generic description of the treasure-hunt task. In this task, the four treasure sites were said to provide different amounts of monetary rewards but no range was mentioned.

Participants were asked to consider playing two rounds of the game, one where a computer simulation randomly revealed a site and the participant learned what amount of money could be gained there, and one where another participant randomly revealed a site and the participant learned what could be gained there.

To test group-level perspective-taking, participants rated their agreement with the following four statements, presented in random order (1 = *not at all*, 7 = *very much*): "In this game, how natural it is to think of the computer simulation and yourself (in Game 1) as a team to explore the unknown treasures together?", "In this game, how natural it is to think of the other person (in Game 2) and yourself as a team to explore the unknown treasures together?", and two similar statements where the word "natural" was replaced by "intuitive."

To determine group-level perspective taking across information sources, we averaged the "natural" and "intuitive" measures for the social round into one group-perspective-taking index, and averaged the measures for the mere-information round into a separate group-perspective-taking index (Cronbach's α = .83 and α = .84, respectively). Supporting our assumed mechanism, a paired samples *t*-test revealed that group-perspective-taking was higher for the social-information round (*M* = 4.60, *SD* = 1.42) than the mere-information round (*M* = 3.54, *SD* = 1.57), $t(80) = 5.52$, $p < .001$, Cohen's $d = 0.87$. These results suggest that participants are, in fact, more inclined to adopt a group-level perspective with social than mere-information sources.

Method

Participants. We opened 400 HITs to U.S.-based participants on MTurk and provided a $0.20 fixed payment plus a variable performance-based bonus. MTurk returned 403 participants (M_{age} = 36.91, *SD* = 11.76, 46% women; three people reported either non-numerical answers or impossibly high numbers for their age and were excluded from calculations of mean age and standard deviation of age).

Procedure. The experimental setup was similar to Study 2, except that in this study we compared the mere-information condition to three social conditions in a between-participants design. Participants started with a zero balance and could earn money by choosing sites on three rounds. We used the same social-information condition as in Study 2, as well as the same mere-information condition, except that we replaced words referring to "choosing" with ones referring to "revealing," to be consistent with the choice-without-experience condition described below. The two new social conditions were "choice-without-experience" and "experience-without-choice."

In the choice-without-experience condition, the information provider could choose a site, but could not earn money from that site. Participants in this condition read, "M. F. has been randomly assigned to be the 'Revealer.' This means in each round, M. F. will choose 1 site to reveal to you. Then, you will make your selection. M. F. does not know what is contained in the sites, will not make any selections for themselves, and will not receive any bonus pay regardless of what you choose."

In the experience-without-choice condition, the information provider could not choose a site for themselves, but they could earn money from their assigned site. Participants in this condition read, "M. F. has been randomly assigned to have no choice of what they will receive. This means in each round, the computer program will automatically assign M. F. to get what is in a randomly chosen site. M. F. does not know what is contained in the sites."

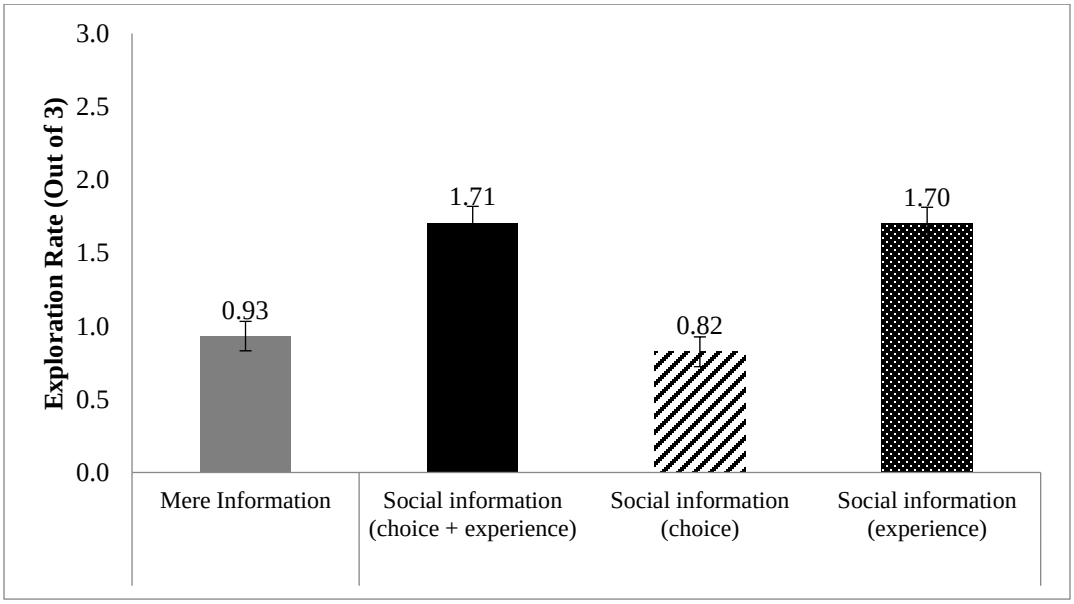
Results and Discussion

We calculated participants' exploration score as the number of unknown sites they visited across the three games (between zero and three). A one-way between-participants ANOVA with 4 levels (mere information vs. social information vs. choice-without-experience vs. experience-without-choice) yielded the predicted main effect of information source, $F(3, 399) = 20.19$, $p < .001$, $\eta_p^2 = 0.13$ (see Figure 5). Replicating the basic effect, we found higher exploration rates in

the social-information condition (M = 1.71, SD = 1.14) than the mere-information condition (M = 0.93, SD = 1.02), $t(399) = 5.19$, $p < .001$; Cohen's $d = 0.71$. Supporting the first hypothesis, pairwise contrasts reveal that exploration rates in the choice-without-experience condition (M = 0.82, SD = 1.00) were lower than the social-information condition, $t(399) = -5.82$, $p < .001$; Cohen's $d = 0.82$, and similar to the mere-information condition, $t(399) = -0.71$, $p = .478$; Cohen's $d = 0.11$. Supporting the second hypothesis, the exploration rates in the experience-without-choice condition (M = 1.70, SD = 1.10) were higher than in the mere-information condition, $t(399) = 5.16$, $p < .001$; Cohen's $d = 0.73$, and similar to the social-information condition, $t(399) = -0.02$, $p = .985$; Cohen's $d < .01$.

Figure 5

Exploration score as a function of information source



Note. Results of Study 3. Exploration rates were high when receiving information from a person who chose and experienced the outcome or a person who only experienced the outcome. Exploration rates were low when receiving information from someone who only chose an outcome or from a nonsocial source (mere information). Error bars represent +/-1 standard error.

The results of Study 3 provide further evidence for our proposed mechanism. First, we found more we-perspective-taking when getting information from another person versus a computer. Second, we found that the information provider's experience of a given outcome, rather than their choice of that outcome, plays a crucial role in others' exploration behavior. In Supplemental Study S3, we replicated the finding that another person's experience increases exploration.

Possibly, learning about a site from a social other who is only able to reveal, but not obtain the rewards, may have created social pressure not to explore, as exploring could convey a lack of appreciation for the effort and time devoted to selecting the revealed site. This would be an alternative explanation for why exploration was lower in the choice-without-experience condition. Though worth mentioning, we believe it is less likely because it would assume participants were meaningfully motivated to convey appreciation to an anonymous player who was simply assigned the role of the "revealer" by the experimenter.

Taken together, these results support the group-level perspective-taking mechanism. At a group level, to re-experience a fellow group member's obtained rewards is redundant, which leads to exploration when outcomes are experienced by others. But if the same choice has been made by another group member without them experiencing the outcome, then repeating that same choice is more likely because the associated experience has not been exploited yet. This outcome rules out the alternative account whereby people explore more in social conditions due to a desire to express their agency or uniqueness. If this desire was a prime motivator, exploration rates should have increased when another person chose an experience, regardless of whether they experienced it or not.

Study 4: Social Exploration in Everyday Choice

The treasure-hunt paradigm used throughout our previous studies has the benefit of being simple and incentive-compatible; however, might the idiosyncrasies of this paradigm have lent themselves too well to the social-exploration effect? Will the effect generalize to the kinds of exploration decisions people make in their everyday lives? Study 4 was designed to test the social-exploration effect using a different paradigm and a more realistic context. Specifically, we tested participants' choice of movie clips (mimicking similar choices that people often make on YouTube, Netflix, etc.). Finding the effect in this context would provide evidence that it generalizes to exploration decisions more broadly.

Using the movie-choice context, we compared the mere-information condition to two social conditions, where the other person was closer to or more distant from the self. People tend to blur the boundaries between themselves and interpersonally close (vs. distant) others (Aron et al., 1991), making it possible that people might then explore more with closer, rather than more distant others. However, because people tend to adopt a we-perspective so intuitively, including with people with whom they have minimal or no psychological connection (see Sloman & Rabb,

2016), the perceived closeness of a close (vs. distant) other may not influence exploration rates. Thus, this part of the investigation was exploratory.

Method

Participants. We opened 600 HITs to U.S.-based participants on MTurk and provided a $0.30 fixed payment. MTurk returned 633 participants. Prior to condition assignment, 28 participants failed an attention check which prevented participants who failed from continuing in the experiment. After excluding these participants, the final sample included 605 participants (M_{age} = 37.69, *SD* = 12.04; 50% women).

Procedure. This study used a 3 (mere-information vs. close-other information vs. distant-other information) between-participants design. After completing an attention check, all participants were asked to imagine they were on a video-sharing website and were choosing between 4 short videos (A, B, C and D), each lasting 5 minutes. Participants were not given information about any of the videos, except for rating information for one of the videos, which was revealed to the participant as being 7 out of 10. In the mere-information condition, this rating came from an algorithm associated with the website. In the close-other and the distant-other conditions, this rating came from an ostensible user of the website ("Alex") who had watched the video. In the close-other condition, Alex's geographical location was shown to be the same town in the U.S. as the participant. Note that while an unknown person in the same town might normally not be considered interpersonally close, in global online environments such as YouTube, encountering another person from one's town probably does create a feeling of closeness. In the distant-other condition, Alex's geographical location was shown to be Auckland, New Zealand, which is geographically very distant from the U.S.

All participants then answered a comprehension check question, confirming they understood the rating of the video. They then answered our main dependent variable: they chose which of the 4 video clips they would like to watch. After their selection, all participants answered an open-ended question asking them to explain what factors they considered when making their choice. Participants in the close-other and distant-other condition then answered a manipulation check, rating how close they felt to Alex (1 = *not close at all*, 7 = *very close*). All participants then rated whether 7/10 was a good rating for a video, and answered an attention check asking which video's rating had been shown to them. Lastly, participants answered a second comprehension check asking them to report the source of the video rating information.

Whether participants would actually watch a video or not following their choice was left ambiguous. They did not, in fact.

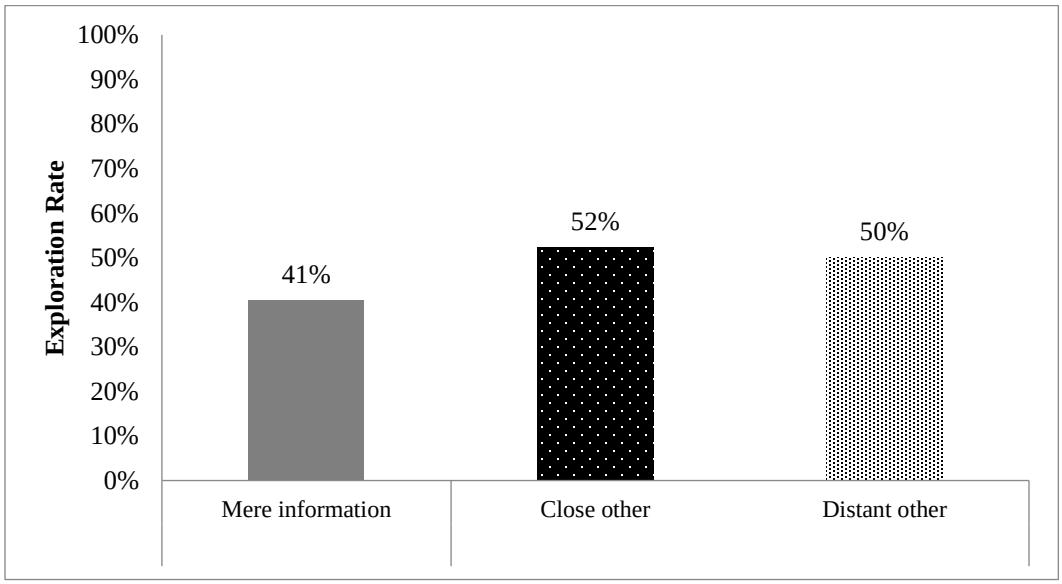
Results and Discussion

Exploration rate—whether participants chose to watch an unrated video clip—varied by condition, $\chi^2(2, N = 605) = 6.25$, $p = .044$, Cramer's $V = .10$, with the mere-information condition showing lower exploration rates (81/200, 41%) than the close-other condition (105/201, 52%) and the distant-other condition (102/204, 50%) (see Figure 6). Replicating our basic effect, we find that exploration rates were higher in the social-information conditions (close-other and distant-other conditions combined) (207/405, 51%) than in the mere-information condition, $\chi^2(1, N = 605) = 6.04$, $p = .014$. The odds ratio was 1.54, suggesting a small effect size.

Confirming our interpersonal closeness manipulation, participants in the close-other condition felt closer to Alex ($M = 3.39$, $SD = 1.80$) than those in the distant-other condition ($M = 2.61$, $SD = 1.60$), $t(403) = 4.65$, $p < .001$. Yet, feeling closer (vs. more distant) did not increase exploration, $\chi^2(1, N = 405) = 0.20$, $p = .652$. The odds ratio was 0.91, suggesting a trivial effect size.

Figure 6

Exploration rate as a function of information source



Note. Results of Study 4. Participants in the close-other and distant-other conditions explored more than those in the mere-information condition, but equally as each other.

Responses to the open-ended response mainly fell into 6 categories (see Table 5 in the SOM), the most common of which was, "relied on rating information" (131/786, 17%). No participant mentioned reasons related to adopting a we-perspective.

Taken together, the results of this study provide evidence that the social-exploration effect generalizes to the types of exploration contexts that people encounter in the real world. Further, we tested whether interpersonal closeness influences people's tendency to explore in social contexts and did not find evidence that it did. Instead, it seems that minimal psychological connection is enough to activate the desire to explore, as long as the sociality of information sources is made salient.

General Discussion

Exploration decisions are ubiquitous (Melhorn et al., 2015; Wilson et al., 2014). People regularly face decisions between known, safer options and unknown, riskier options. In making these decisions, people may or may not be aware of when existing knowledge comes from other people's experiences. For instance, a person looking to buy a new smartphone can learn about options from other people describing the features of the phone, or they can learn the same information from less socially-salient sources, like product descriptions on the manufacturer's website. Our research contributes to the exploration literature by suggesting that source information plays a significant role in such decisions.

In a series of studies using minimalist and incentive-compatible tasks, we found evidence for the social-exploration effect: people explored unknown options more when information about known options came from another player than when the information source was not mentioned or was a computer program. This effect persisted across a wide range of outcome values (Study 1a), when the task was framed as a financial task that emphasized profit-maximization instead of the enjoyment of a game (Study 1b) and when the participants came from a collectivistic culture (Study 1c). The same effect was also obtained in a paradigm that mimicked commonly encountered decisions in everyday life, where participants were more likely to explore new movie clips that others had not seen before (Study 4).

We have theorized that this social-exploration effect occurs because, when people are aware that information about options comes from other people, they intuitively switch from an individual-level perspective to a group-level perspective. That is, they switch from a me-and-you perspective to a we-perspective. When taking a we-perspective, people tend to explore more

because they wish to diversify their experience as a group. Indeed, we found a greater tendency towards we-perspective in social conditions (Study 3 pretest). Further, we found the social-exploration effect was reduced when the options were in the domain of losses (vs. gains), which suppressed we-perspective (Study 2). We also found that the effect was reduced when the social information sources did not experience the outcomes associated with their information, because not yet having a group experience precluded participants from diversifying their group's experience (Study 3 and Study S3). The effect remained when the social information sources experienced the outcome associated with their information without having made a choice (i.e., when they were randomly assigned an outcome; Study 3).

Exploration as a Social Process

People explore their environment for a variety of reasons and frequently do so despite risks involved. For one, exploration reveals new information, which reduces epistemic uncertainty about the environment and its offerings (Speekenbrink & Konstantinidis, 2015). This knowledge can be beneficial in future interactions with the environment, especially over time. Indeed, people explore more when options are more varied and uncertain (Lejarraga et al., 2012) and when they expect to interact with the environment for a longer period of time (Carstensen, Isaacowitz, & Charles, 1999; Wilson et al., 2014). Beyond providing functional benefits, exploration also satisfies psychological needs. For instance, people explore because novel experiences provide stimulation (Hirschman, 1980; Raju, 1980; Zuckerman, 1979). People also explore purely to satisfy their curiosity—they seek information for the sake of alleviating uncertainty, even when it provides no tangible benefits (e.g., celebrity gossip; Golman & Loewenstein, 2019; Loewenstein, 1994) and even when doing so results in negative experiences (e.g., mild electric shocks; Hsee & Ruan, 2016).

Previous work has largely understated how social the drive to explore may be at its core. Yet, exploration is rooted in social context. In ancient times, people explored together to accumulate collective knowledge about the environment (e.g., edible foods, safe shelter spaces); in modern times, scientists similarly explore ideas together to build a shared, collective body of knowledge (Higgins, 1996; Levine & Higgins, 2001). Our findings suggest that the tendency to consider the self and others as part of a group when exploring the environment is intuitive and easily activated. In our paradigm, this tendency led to more exploration in social contexts, despite the fact that participants could not influence other people's choices, communicate or

manage others' impression of them, and despite conflicting motivations not to explore (e.g., the desire to maximize one's own individual outcomes). The ease with which participants in the current research adopted a we-perspective with others, which subsequently motivated their tendency to explore, speaks to the possibility that exploration is, at its core, a social process that is activated when working with others.

The "Social" in Social Cognition

The current work has implications for the study of social cognition. Traditionally, social cognition research assumed that the same principles that govern how people process information about objects also govern how people process social information. Over time, however, researchers have begun to uncover the ways in which people respond differently to information associated with social and nonsocial targets (Schlösser, Mensching, Dunning, & Fetchenhauer, 2015). For example, people automatically imitate the movements of a human hand faster than the movements of a functionally equivalent robot "hand" (Press, Bird, Flach, & Heyes, 2005), and they exhibit better cognitive reasoning when testing social rules than when testing nonsocial rules. So, in the Wason Selection Task (Wason, 1968), people find it more intuitive to check for drinking violations—whether a person drinking alcohol is under 21—than check for violations of nonsocial propositions—whether a card showing the color brown on one side violates the proposition, "if a card shows an even number on one face, then its opposite face is red" (Cosmides & Tooby, 1992). In these cases, social cognition is governed by essentially the same cognitive principles that manage how people process information about objects, albeit in a deeper, better and sometimes faster way.

Our research identifies another difference between the processing of social and nonsocial information: the emergence of a we-perspective tendency in social, but not in nonsocial contexts. We find that, absent any direct relationship between decision makers and social information sources, decision makers default to incorporating their own and others' experiences into a unified, collective whole. That is, they intuitively consolidate their experiences with other people's experiences, rather than consider them as separate. This new angle highlights the uniqueness of the "social" aspect of social cognition and suggests fruitful avenues for future research.

Implications

Our findings inform the decision-under-uncertainty literature. This literature identifies

systematic differences between description-based and experience-based decisions (Armstrong & Spaniol, 2017; Hertwig, Barron, Weber, & Erev, 2004; Martin, Gonzalez, Juvina, & Lebiere, 2014). Specifically, this work argues that people tend to make different decisions based on given descriptions of the outcome space (e.g., the potential outcomes and their corresponding probabilities; Kahneman & Tversky, 1979) or based on first-hand experiences with distributions (e.g., sampling the distribution, experiencing the outcomes). Here, we highlight a third, hybrid way that people may become familiar with choice options: experiencing them through group-level perspective-taking. That is, we find that people may make decisions by drawing on descriptive information from social others that is combined with the perceived experiences of those social others.

Our research points to a spontaneous we-perspective and to a tendency to perceive others' experiences as linked to one's own. As such, it might appear inconsistent with research on perspective-taking failures, egocentrism and self-other empathy gaps (Epley, Keysar, Van Boven, & Gilovich, 2004; Keysar & Henly, 2002; Van Boven, Loewenstein, Dunning, & Nordgren, 2013). Are people intuitive perspective-takers, or are they ineffective at taking the perspective of others? While the answer is probably "in-between" (i.e., neither perfect nor horrible), the degree to which perspective taking occurs might depend on whether people have their own perspective on the issue before encountering others'. When they do, they tend to anchor on their own perspective more than they should. They might fail at perspective taking (Epley et al., 2004; Van Boven et al., 2013) or anchor on their own prior opinions and insufficiently adjust them when presented with pieces of advice (Bonaccio & Dalal, 2006; Yaniv & Choshen-Hillel, 2012). Yet in social exploration contexts, individuals lack personal experience with options in the choice set. In such contexts, egocentric tendencies cannot come to bear and a we-perspective (which requires perspective-taking), drives exploration behavior.

Psychologically, taking a we-perspective is a process similar to vicarious experience (only a we-perspective does not involve source confusion). And indeed, both phenomena may lead to both conformity and divergence. When people have vicarious experiences, they treat others' actions as their own and, at times, they feel they have made progress and can disengage (e.g., vicarious licensing; Kouchaki, 2011); other times they seek consistency (e.g., vicarious sunk costs; Gunia, Sivanathan, & Galinsky, 2009; Olivola, 2018). When people want to explore, a we-perspective encourages exploration because another person's outcomes are considered

group outcomes and one's goal becomes to diversify outcomes at the group level. However, in contexts where people want to exploit options, a we-perspective may well encourage exploitation for the same reason: because another person's outcomes are considered group outcomes, and the goal becomes to concentrate outcomes at the group level.

Alternative Explanations

We considered several alternative explanations for the social-exploration effect. One such explanation is that people explore more in social contexts than in mere-information contexts because they seek to express their individuality and uniqueness to other people (Ariely & Levav, 2000). This account suggests that people deliberately explore in social contexts as a form of impression management—to appear personally distinct and to avoid appearing to imitate others. If this were the case, the social-exploration effect should disappear in contexts that mitigate the value of impression management, such as when information recipients are unable to interact with information sources, when the options are non-taste-based (and therefore do not signal individual identities; Berger & Heath, 2007), or when outcomes are private. However, we find that people explore more in social contexts under these circumstances, which makes uniqueness seeking a less likely explanation.

A related possibility is that people care about differentiating themselves from others for private reasons, independent of impression management concerns. This account predicts that the information source's choice, but not necessarily their experience, should mitigate the social-exploration effect because repeating someone else's choices would undermine one's perception of oneself as unique. Yet, that is not what we found. Additionally, this account would predict similar exploration rates in the gain and loss domains because the desire to distinguish oneself from others should apply similarly to both contexts. Contrary to this account, but consistent with the we-perspective account, we found that social exploration depends on the information source's experiences of outcomes and not on their choices (Study 3). It also attenuated when options were in the loss domain (Study 2). Together, these results suggest that personal motivations to express one's uniqueness or make choices that have not been made before (e.g., to be the first to sample a piece of information, to make an independent choice, to avoid feeling like a "copy-cat," etc.), did not drive the effect.

Possibly, the social-exploration effect results from people's desire to outperform others. Yet, this alternative, based on competition, is also difficult to reconcile with the attenuation of

the effect in the loss domain because the competitive drive and the desire to obtain more rewards ought to apply similarly across gain and loss domains. We also tested competition more directly in a supplemental study (Study S1 in SOM) that manipulated whether outcomes were shared or not with the information source. We found no moderation of the effect. That is, when participants learned they would share their profits with the previous player, as they are both "a team," they were still more likely to explore compared to when they split their profits with a nonsocial source.

Other possible explanations include a desire to maximize information for the group and to avoid taking advantage of other group members' efforts. The former account supposes that people explore in social contexts because gathering additional information can directly benefit others, and the latter suggests that they do so because it is aversive to "free-ride" on resources that were earned by others. According to the maximizing account, participants would explore more when information comes from social sources, regardless of whether they experienced the associated outcomes of their choice or not. This is because exploring provides more information for others independent of the source's experiences. The free riding account makes the same prediction because exploring avoids capitalizing on others' efforts independent of the source's experiences. Contrary to both accounts, we found in Study 3 that participants were less likely to explore when social sources do not experience outcomes. We also tested information maximization motives more directly in a supplemental study (Study S2 in SOM) and found no moderation of the effect.

Open Questions and Future Directions

Several open questions remain. First, we documented the social-exploration effect in contexts in which exploration was, to some extent, desirable. It is not yet clear how social reminders influence exploration in contexts in which individuals are more averse to exploration. Possibly, the social-exploration effect would be weaker. For example, higher stakes could dampen the social-exploration effect by lowering exploration both in social and mere information contexts and therefore, decreasing the difference between these conditions. Future research could test situations that suppress exploration (e.g., when unknown options involve high risk or high costs) as a boundary condition. Similarly, when exploitation is especially preferable (e.g., when known options involve high sentimental value or personal meaning), the social-exploration effect may be weaker.

Second, our experiments focused on exploration contexts in which individuals learned about a single other person's choices and experiences. Though this design captures the essential dichotomy between social and nonsocial exploration, future research could explore whether the individuality of the social entity—whether it is a single person or a group—influences the social-exploration effect. It is possible that the requisite we-perspective tendency is activated by merely knowing that one is exploring with a social entity, regardless of whether they are an individual or a group. In this case, we would expect social exploration to be equally powerful in both contexts. However, past work on the identifiable victim effect (Jenni & Loewenstein, 1997) demonstrates that individual targets and group targets can elicit different reactions and treatment, which may translate to moderation of the social-exploration effect.

Lastly, future research could extend our findings by investigating other measures of we-perspective-taking in order to provide further evidence for the proposed mechanism. For instance, future experiments could examine whether individuals exploring in social contexts use more inclusive pronouns (e.g., "we" and "us") when describing their experiences in the game. We would indeed predict that the use of inclusive language would be higher for people exploring in social contexts than those exploring in mere information contexts.

Conclusion

We follow a rich tradition of behavioral decision researchers in employing a minimalistic paradigm in our empirical work, using monetary and experiential rewards. Despite its simplistic nature, this paradigm mirrors the characteristics of many real-life decisions. From decisions about financial investments, to entertainment, to education, people use information that comes from the experiences of others when choosing how and whether to explore their environment. Our paradigm was designed to capture the psychology underlying such decisions.

We found that increasing awareness that existing information had been obtained through other people's experiences encouraged exploration. For those seeking to encourage exploration in others, our findings offer a simple intervention: make salient the fact that existing information is available due to previous explorers.

Table 1

Overview of studies and exploration rates across studies

Study	*n*	Main Finding	Average exploration rate (across reward amounts and independent decisions) and effect sizes			
			Mere Info	Social Info	Statistical Test	Effect Size
1a	427	Participants were more likely to explore when the source of information about a known option was another player (vs. an unmentioned source).	55%	72%	$\chi^2(1, N = 427) = 12.83, p < .001$	Odds Ratio = 2.08
1b	251	Participants were more likely to explore when the information source was another player (vs. computer), regardless of framing the choice as a game or a profit-maximization task.	44%	71%	$\chi^2(1, N = 251) = 18.53, p < .001$	Odds Ratio = 3.10
1c	264	Participants in a collectivistic society were more likely to explore when the information source was another player (vs. computer).	13%	36%	$\chi^2(1, N = 264) = 17.80, p < .001$	Odds Ratio = 3.64
2 (pretest)	100	Framing of options as losses (vs. gains) reduced group-level perspective-taking.	N/A	N/A	$t(98) = 2.99, p = .003$	$d = 0.60$
2[a,b]	202	Only for gains (vs. losses), participants explored more when the information source was another player (vs. computer).	0.98[a]	1.98[a]	$F(1,198) = 22.43, p < .001$	$\eta_p^2 = 0.10$
3 (pretest)	81	Participants reported more group-level perspective-taking when the information source was another player (vs. computer).	N/A	N/A	$t(80) = 5.52, p < .001$	$d = 0.61$
3[b]	403	Participants explored more when the information source was another player who experienced the known option and either chose it or not, than when it was a computer or when it was another player who chose but did not experience the known option.	0.93	1.71	$t(399) = 5.19, p < .001$	$d = 0.71$
4	605	Participants were more likely to explore movie clips when the source of information was another player (vs. computer).	41%	51%	$\chi^2(1, N = 605) = 6.04, p = .014$	Odds Ratio = 1.54

[a] Results of Study 2 presented in this Table only include the gain conditions.

[b] Results reflect number of exploration decisions (up to 3).

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