

**Understanding Expertise Search Strategies at Networking Events:
An Exploratory Study Using Sociometric Badges**

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ABSTRACT

Research summary

In this study we ask how individuals search for experts at networking events. Building on the intuition that individuals' propensities to engage in certain search actions, as well as their effectiveness in locating experts, will depend on the quality and salience of the metaknowledge they have about others, we conducted an expert search game as a field experiment in which we randomly assigned participants – researchers in a multinational corporation – to one of three treatment conditions, reflecting varying degrees of search planning. Based on data from sociometric badges, we derive a taxonomy of the micro-decisions individuals make at events. We find that letting others approach yields more referrals than taking the initiative in starting conversations, and that planning increases the tendency to maintain such initiative even when doing so is ineffective – a possible manifestation of the Einstellung effect.

Managerial summary

Networking events play a fundamental role in fostering our professional lives. At such events, we meet new people and access expertise relevant to our jobs and personal lives alike. The availability of plentiful information about others on social media has not reduced the importance of in-person events. Rather, it has enabled people to prepare and develop strategies before joining such events. This paper analyzes which strategies are more likely to lead individuals to the expertise they need. We set up a game in which researchers from a multinational corporation had to find experts in a controlled event setting. We varied the amount of planning the participants did before the game started. We found that allowing others to approach you for help resulted in more referrals than actively initiating conversations. Interestingly, we also found that planning too much sometimes caused people to persist in initiating conversations even when it was not the most effective strategy.

1. INTRODUCTION

Networking events perform an important role in orchestrating interpersonal interactions within and across organizations (Ingram & Morris, 2007; Shipilov, Labianca, Kalnysh, & Kalnysh, 2014; Stam, 2010). One significant function of such events is to allow individuals to search for experts who hold the information they need as input for their work (Casciaro, Gino, & Kouchaki, 2014; Dyer, Gregersen, & Christensen, 2008). In this study, we explore the search strategies individuals adopt when locating experts at networking events. In such complex social settings, individuals make a series of micro-decisions as they navigate the social environment (Collins, 2014; Goffman, 1967; Krishnan, Cook, Kozhikode, & Schilke, 2021), yet the nature of these decisions, as well as their antecedents and effectiveness, remain unclear.

Despite growing scholarly interest in the behavioral aspects of networking and expertise search (Bensaou, Galunic, & Jonczyk-Sédès, 2014; Hallen & Eisenhardt, 2012; Obstfeld, 2005; Singh, Hansen, & Podolny, 2010; Vissa, 2012), extant research still lacks the conceptual toolbox with which to describe and interpret the full repertoire of micro-decisions that underpin interactions at networking events, such as whether to initiate a conversation or let others approach, and – in the case of the former – who to approach. First, while research on networking behavior has made major strides in characterizing individuals' overall approaches and attitudes to networking (Vissa, 2012) – for example, delineating networking approaches that vary in the extent to which they favor authentic versus instrumental behaviors (Bensaou et al., 2014; Casciaro et al., 2014) – it has yet to unravel how such differences may translate into the precise search decisions that individuals make at events. Second, whereas research on tie formation provides a rich understanding of the mechanisms underpinning patterns of information access and advice seeking – for example, highlighting the role of referrals (Singh et al., 2010) and reciprocity (Baker &

Bulkley, 2014) – it stops short of explaining whether and how such mechanisms manifest during events. There are reasons to believe that the dynamics of interactions at events may differ from those in other professional contexts. For example, an individual’s decision to take the initiative in starting interactions will be shaped by the actions of the many alters around them (Kleinbaum, Jordan, & Audia, 2015). Likewise, the willingness of a given alter to share information (Schnettler, 2009) may depend on that alter’s perception of ego’s behavior (Casciaro et al., 2014).

The lack of a comprehensive theoretical toolkit in relation to search micro-decisions suggests that we know very little about the antecedents of different search strategies at events and their effectiveness. We build on the intuition that individuals’ propensity to engage in certain search actions, as well as their effectiveness in locating experts, will depend on the quality and salience of the metaknowledge they have about others. Specifically, we investigate which strategies are most effective at locating experts under varying levels of metaknowledge, and to what degree individuals follow such strategies. Our empirical strategy consists of an expert search game in the form of a field experiment. In an event held by a large multinational corporation, we asked 69 of its researchers to locate a certain other participant – their search target – who had the requisite expertise to answer a specific technical question assigned to them. We randomly assigned participants to one of three treatment conditions – reflecting differences in the quality and salience of participants’ metaknowledge of others (i.e., of their area of expertise) – by varying the degree to which participants planned their search prior to the game.

Our analytical approach consisted of two parts. First, based on data from sociometric badges (cf. Lane, Ganguli, Gaule, Guinan, & Lakhani, 2020; Wu, Waber, Aral, Brynjolfsson, & Pentland, 2008; Ziegert, Knight, Resick, & Graham, 2022) and self-reported interaction forms, we built a taxonomy of search micro-decisions that capture the full repertoire of behaviors individuals

undertake when searching for expertise in event settings. Second, we analyzed the effectiveness of different micro-decisions in helping locate expertise as well as how planning affects individual propensity to engage in such behaviors.

Our analysis brought two core insights. First, letting others approach yields more referrals than taking the initiative in starting conversations. Second, exercising forethought in the form of planning increases the tendency to take control in initiating conversations. Together, these two findings explain why some participants engaged in networking behaviors that proved ineffective. Whereas participants who planned their search based on high-quality metaknowledge and those who did not plan at all tended to make search micro-decisions that proved effective, participants who planned on the basis of low-quality information tended to take control in initiating interactions but would have been better off taking advantage of the greater referral yield associated with letting others do so. The mere act of planning appeared to blind individuals to opportunities inherent in such an indirect strategy – a possible manifestation of the Einstellung effect (Gersick, 1994; Luchins, 1942).

Our findings contribute to our understanding of interactions and expertise search in two main ways. First, our work helps to unveil the micro-level building blocks of networking actions in event settings. Although these strategies build on preexisting concepts and mechanisms, such as forethought, referral, attribute-based search, random search, and reciprocity, the taxonomy we introduce offers a comprehensive overview of the repertoire of search decisions individuals make when navigating interactive social contexts. Second, our findings demonstrate how individual and social factors jointly drive behavioral decisions and their effectiveness. While social norms, such as those of reciprocity, make indirect search behaviors more effective than one might anticipate, limits to individual cognition may prevent individuals from adopting these behaviors.

2. SEARCH STRATEGIES AT NETWORKING EVENTS

2.1 Prior research on networking and expertise search

Differences in individuals' abilities to acquire expertise through their networks have been at the forefront of scholarly attention for decades (Brass, Galaskiewicz, Greve, & Tsai, 2004; Burt, 2004; Granovetter, 1973). Whether it is a member of an organization searching for an expert on a topic (Borgatti & Cross, 2003; Gray & Meister, 2004; Hansen, Mors, & Løvås, 2005; Nebus, 2006), a CEO seeking advice (Kiss et al., 2019; McDonald, Khanna, & Westphal, 2008), an entrepreneur on the lookout for business opportunities (Cooper, Folta, & Woo, 1995; Stuart & Sorenson, 2007), or someone looking for a job (Granovetter, 1974; Obukhova & Kleinbaum, 2020), those better able to obtain valuable information from their networks will be at an advantage (Burt, 2000b; Seibert, Kraimer, & Liden, 2001). For this reason, scholars have long sought to address the question of how individuals can best navigate their networks to locate expertise, and to what extent they actually follow successful strategies (Killworth & Bernard, 1978; Singh et al., 2010).

Although the search for information and expertise occurs in a large variety of day-to-day work settings (Singh et al., 2010), networking events perform an important role in cultivating relationships with relevant experts and accessing their expertise (Ingram & Morris, 2007; Shipilov et al., 2014; Stam, 2010). Within organizations, events facilitate socialization among colleagues, which may culminate in both anticipated and unanticipated opportunities to seek input from one another (Busch & Barkema, 2020). Meanwhile, outside organizations, conferences and networking events not only allow individuals to meet new people, but also enable attendees to locate specific experts and leverage the opportunity to tap into the knowledge and experience of those with whom they interact (Shipilov et al., 2014; Spigel, 2017; Vissa, 2012).

In such complex settings, individuals make a series of micro-decisions as they navigate the

social environment (Collins, 2014; Goffman, 1967; Krishnan et al., 2021). At events, for example, individuals will need to decide whether to initiate conversations or let other people approach them. Assuming that they take the initiative, they will need to decide whether to target specific individuals whom they anticipate might have the expertise they seek, or instead approach others either randomly or on the basis of vague and implicit clues and hunches.

In recent years, research on networking has started to identify and appraise the various networking “strategies” on which individuals may rely (e.g., Bensaou et al., 2014; Vissa, 2012). That is, after decades of research rooted in the so-called structuralist paradigm (Hallen, Davis, & Murray, 2020; Tasselli & Kilduff, 2021), network scholars have begun to move away from a pure focus on network structure toward one that also embraces the role of individual agency (Emirbayer & Goodwin, 1994; Gulati & Srivastava, 2014). As part of this shift in focus, networks are increasingly seen not merely as external structures that constrain individual actions but as dynamic and malleable webs that are – partially at least – created and managed through action (Kilduff & Krackhardt, 2008). This research is complemented by the significant inroads made toward understanding individual attitudes to networking itself, as seen through the lens of morality; highlighting, for example, the aversion many individuals feel when engaging in an activity (i.e., networking) that they regard as artificial and exploitative of others (Casciaro et al., 2014; Kuwabara, Hildebrand, & Zou, 2016). Yet, given that research on networking behavior is still in a nascent state, it is not surprising that many important aspects of the behavioral dynamics in networking event settings remain relatively unexplored.

Specifically, existing research on networking has made significant strides in the description and characterization of individual differences in style and approach, using high-level dichotomies and categorizations. For example, Vissa’s (2012) study on entrepreneurial networking describes

networking style as being either broadening or deepening, according to whether its focus is on, respectively, new or existing ties. The work of Bensaou et al. (2014) on service professionals led them to the identification of three types of networkers – devoted players, purists, and selective players – in terms of their attitude toward networking and the amount of effort they invest in the activity. In Hallen and Eisenhardt’s research (2012), the separation of strategies is based on individuals’ reliance on strong versus weak ties, while Obstfeld (2005) speaks of approaches to brokering opportunities, namely, the *tertius iungens* and *tertius gaudens* orientations. Although the characterization of these high-level strategies has brought into sharp focus key differences in the approach people take, the micro-level decisions on how to leverage specific social contexts such as events to one’s advantage remain ill-understood for two main reasons.

First, the emerging body of work on networking behavior typically operates on relatively long timescales. Networking is often observed for periods of months or even years and captures overarching patterns that emerge over time (e.g., Bensaou et al., 2014; Obstfeld, 2005). From such a perspective, networking strategies manifest as revealed preferences for certain types of behaviors over others, and average tendencies that cannot easily be reduced to single interactions. As a result, it is not clear whether or how those tendencies shape the often dynamic and highly paced interactions typical of networking events. Without understanding the discrete and relatively brief social interactions that make up search strategies at networking events, it is difficult to draw conclusions about the micro-level decisions individuals make at events and how these may amount to a successful search strategy.

Second, most networking strategies described in research on networking are egocentric, in that they characterize the behavior from the perspective of the focal individual while ignoring the perspective of the alter – a shortcoming shared by the majority of recent studies on individual

differences in social network use (Kleinbaum et al., 2015). Networking strategies are typically described in terms of ego's orientations or styles (e.g., Obstfeld, 2005; Vissa, 2012), with alters remaining largely passive. As such, relatively little is known about the role of alters in shaping ego's strategies by, for example, initiating important interactions, or providing or withholding valuable referrals.

Conversely, research on tie formation is a more mature area of research and many mechanisms discussed in this literature will likely also apply in some form to expertise search in event settings. For example, this body of work has highlighted the important role of referrals in how individuals iteratively search for expertise (Singh et al., 2010). It has also investigated how norms of reciprocity guide long-term patterns of exchange between pairs or groups of individuals (Baker & Bulkley, 2014; Molm, 2010). Yet, it is not evident how these core mechanisms that underpin long-term patterns of exchange in regular professional or organizational settings may extend to event settings. There are reasons to believe that the behavioral dynamics of interactions at events may differ from those in other professional and organizational contexts.

First, whereas decisions about who to turn to for advice outside of event settings are primarily driven by a focal individual's cognition, such as their knowledge about who knows what (Brandon & Hollingshead, 2004; Cross, Parker, Prusak, & Borgatti, 2002) and their patterns of cognitive network activation (Khattab, Van Knippenberg, Pieterse, & Hernandez, 2020; Smith, Menon, & Thompson, 2012), the interaction decisions of individuals at events will be strongly shaped by the alters around them (Kleinbaum et al., 2015). For example, individuals may consider approaching people who would not have come to mind if they had not been proximate. In addition, they also face pressures to "accept" conversations initiated by those around them, which may equally lead them to interactions they had no intention of having.

Second, patterns of referral and reciprocity may manifest in different ways in event settings than elsewhere. The willingness of a given alter to share information may depend on their perception of ego (Schnettler, 2009). However, it is not obvious how such perceptions are shaped in the brief exchanges between strangers that typify interactions at events. We can only count on favors from others insofar as we have secured their goodwill (Adler & Kwon, 2000; Baker & Bulkley, 2014; Porter & Woo, 2015). The role of alters cannot, therefore, be ignored in this context; how deeply they are willing to reach into their personal networks to provide resources or referrals is entirely up to them. Yet, it is not clear how goodwill may best be established in the fast-paced social contexts of events in which the lion's share of interactions occur among people who have never met before and may never meet again.

Taken together, it is evident that we lack the theoretical toolbox to characterize the micro-level search decisions that individuals make when navigating networking contexts in search of specific expertise. Revealing what lies in these lacunae of current research is crucial not only from a practical standpoint – allowing for more concrete recommendations on how to leverage events for expertise search – but also from a theoretical one. By turning our attention to the micro-level foundations of networking and search strategies, we may inspire future research to adopt a bottom-up approach and shed light on how and why minute, spur-of-the-moment behavioral decisions aggregate into the higher-level "grand strategies" described by extant work on networking behavior.

2.2 Guiding intuitions about the antecedents and effectiveness of search micro-decisions

Given the lack of a theoretical toolbox to identify and describe the complete repertoire of search micro-decisions that individuals make when searching for expertise at networking events, we have opted for an exploratory approach. That is, we first derive a typology of search micro-decisions

from our data, and then analyze the antecedents of these decisions as well as their implications for search effectiveness, that is, the individual ability to locate the expertise they were looking for. Although we do not produce *ex ante* predictions about the antecedents and performance implications of search micro-decisions, we build on two core intuitions. These intuitions, in turn, inform our experimental design.

First, the *quality* of participants' metaknowledge of other participants will likely matter in the search micro-decisions they make, and in whether these will be effective in leading them to the expertise for which they are looking. With respect to expertise search at events, starting conditions matter. While those entirely unfamiliar with other attendees and with their respective areas of expertise have little choice but to resort to largely random search, those who know certain others and possess metaknowledge of their expertise will be at an advantage. This is because it takes information to find information; those with some knowledge of the network around them, and of others' attributes (in this case, their areas of expertise) may exploit the tendency of similar individuals to cluster in a network (Adamic & Adar, 2005; McPherson, Smith-Lovin, & Cook, 2001; Travers & Milgram, 2011; Watts & Strogatz, 1998), allowing them to locate better-than-random starting points for their search. If they choose their starting point wisely, the people they first approach may provide them with referrals, that is, further relevant information, which may guide their ongoing interaction decisions (Adamic & Adar, 2005).

Second, the *salience* of the metaknowledge of other participants will likely also matter. Although two individuals may possess the same metaknowledge, there may still be variation in the degree to which they are acutely aware of this knowledge and able to utilize it in a timely manner. Individuals can increase the salience of the metaknowledge on which they can act through forethought or planning in preparation for their search (Bandura, 2001). By engaging in planning,

individuals cognitively activate metaknowledge they might have about other participants, rendering this information more salient in their minds and thus more available to guide their search actions (Smith et al., 2012). Thus, those in possession of relevant metaknowledge of others may create a plan of action, making their use of available time more efficient. Entrepreneurs, for example, are known to do this: by reviewing the list of attendees, they can select ahead of time the people to whom they wish to speak (Vissa, 2012). Our experimental design builds on the intuition that individuals who make their metaknowledge of others more salient will likely make different search micro-decisions to those whose metaknowledge is less salient, and that the extent to which such decisions lead effectively to their target expertise may also depend on the salience of such metaknowledge.

3. METHODS

3.1 Experimental design

In this study, we ask how individuals search for expertise at networking events, and what the performance implications are of adopting different search micro-strategies.

To this end, we designed a field experiment in which participants had to search for expertise held by other participants, while sociometric badges tracked their movements. The experiment closely resembled a typical social networking event, in that participants were interacting with multiple others, some of whom they already knew, in a crowded and informal work setting. This resemblance was strengthened by the fact that the experiment took place at the beginning of a larger company-wide event, such that getting to know one another was also an implicit goal, and also by the inclusion of icebreaker questions, an oft-used element of networking events intended as a social lubricant to alleviate initial awkwardness and build rapport (Methot, Rosado-Solomon, Downes, & Gabriel, 2021). The setting enabled us to observe how individuals' search strategies at

networking events are formed as an aggregation of discrete search micro-decisions (cf. Krishnan et al., 2021; Vissa, 2012). In what follows, we first describe our sample, experimental procedures, and variables. We then continue by presenting our data analyses and interpreting our key findings. Finally, we draw out the implications for future networking research, as well as for managers and entrepreneurs.

3.2 Sample

We ran our field experiment in a major pharmaceutical firm, which for confidentiality reasons we refer to as the Umbrella Corporation; Umbrella for short. Umbrella is a major sponsor of scholarships for doctoral and postdoctoral researchers, who thereby have dual affiliations to the company and a university. The experiment took place as part of a two-day career event organized by Umbrella. All the researchers who attended the two-day event decided voluntarily to participate in our experiment after providing informed consent.

The study participants ($N_{\text{individuals}} = 69$; $N_{\text{interactions}} = 571$) were early-career researchers. We chose this population because acquisition and provision of expertise is a key aspect of such knowledge workers' jobs (Gargiulo, Ertug, & Galunic, 2009; Lewis, 2004). This population is ideally suited to studying the search for experts at a networking event in a work context, because every participant had highly specialized expertise that others could seek out. In addition, because the participants worked at different locations and in different research teams, many did not know each other beforehand; initially, 70 percent of participants knew fewer than ten others. Such a high ratio of non-acquaintance is typical of professional networking events. We offered participants a networking training session, but this took place after data collection had been completed to avoid influencing participants' search decisions. Most participants were female (72 percent). Half of the participants were undertaking doctoral studies, and the other half were postdoctoral researchers.

3.3 Data collection procedures

Our experimental design received the prior approval of the lead authors' university's ethics committee. Prior to the main study we conducted three pilot studies: two focused on testing the experimental task at hand and one focused on testing the sociometric badges. The study took place over three phases, which are summarized in Figure 1. To aid the reader's understanding of when certain data were collected, we present our variables within the relevant sections.

----- Insert Figure 1 about here -----

3.3.1 First stage: before the event

In the first stage – three weeks prior to the event – we requested that all participants complete an intake survey online. The survey served three purposes.

First, we collected data about preexisting relations to other participants, including details about who they knew (recognition), how close they felt to them (closeness), and how familiar they were with their research (research awareness). Because these three networks showed a high degree of overlap, we relied in our analyses on recognition network data only. We symmetrized the network data, such that if ego did not indicate knowing an alter but the alter indicated knowing ego, then we considered a recognition tie to be present. Using these data, we measured *degree centrality*, that is, the number of other participants ego knew beforehand. Figure 2 maps the network of preexisting relations among participants. As in real-life networking events or events inside organizations (cf. Ingram & Morris, 2007), our group of participants comprised a mix of strangers and acquaintances.

Second, we collected data on a range of personality, cognitive, and demographic variables in the intake survey to check for potential differences between treatment groups (see “Second stage” section for details) in relation to traits that might conceivably affect search behaviors,

including *sociability* (Cheek & Buss, 1981), *self-monitoring* (Gangestad & Snyder, 2000; Kilduff & Day, 1994), *cognitive flexibility* (Laureiro-Martínez & Brusoni, 2018; Martin & Rubin, 1995), and *perceived self-efficacy* (Chen, Gully, & Eden, 2001). We also measured personality traits using a shortened version of the Big Five Inventory (Rammstedt & John, 2007). Finally, we collected data on participants' gender (0: female; 1: male), country of work/study (0: abroad; 1: home country), and seniority (0: PhD candidate; 1: postdoc).

Third, we used the pre-event survey to source the questions we used during the game. Specifically, we asked each participant to provide us with three multiple-choice questions, each related to the specific science behind their research project (“*the more specific the questions are to your expertise, the better*”), which only someone with in-depth expertise related to that specific work or study area would be able to answer. Each question had four potential answers of which three were incorrect and one correct (see Figure 3). During the game, each participant would be assigned a question developed by another participant and given the task of finding the answer to this question by navigating the room and locating the search target, that is, the Umbrella researcher who wrote the question. Thus, every participant was simultaneously searching for a target while potentially being the target of someone else's search.

To allocate search targets to participants, we developed an algorithm that followed a set of decision rules. The algorithm aimed to exclude as search targets: (1) anyone known to the participant beforehand; (2) anyone to whom the participant was linked through a single intermediary; (3) anyone for whom the participant was a search target.¹ This allocation was possible thanks to our knowledge of the structure of the network *before* the event. To avoid congestion around certain individuals, no one was assigned as a search target more than twice in

¹ Assignment of targets in perfect accordance with these rules was not always possible for those with a high degree of centrality in the network of preexisting relations.

any round. Besides these rules, the allocation of search targets was random.

----- Insert Figures 2 and 3 about here -----

3.3.2 Second stage: instructions and treatment conditions

We started the event by explaining the goal of the game and the rules. As previously discussed, each participant received a question developed by another participant, and was given the task of finding the answer to this question by navigating the room and locating the search target. We instructed participants to find their search target in as few steps as possible and incentivized them accordingly with a prize draw: the fewer steps participants needed to reach their first target, the higher their chances of winning a GoPro camera. To help convey the nature of the experiment to the reader, we have uploaded a short, fully anonymized sample video of the experiment to the Open Science Foundation portal.² Table 1 presents the rules of the exercise and their rationales. We explained these rules beforehand and displayed them on a large screen in the room.

----- Insert Table 1 about here -----

Immediately before the start of the exercise but after receiving their first question, participants completed the tasks associated with their respective treatment condition. In line with our intuitions concerning the *quality* and *salience* of metaknowledge, we randomly assigned participants to one of three treatment conditions, which reflect different degrees of pre-exercise planning. Thus, to create variance in the *salience* of the metaknowledge that participants could use to inform their search decisions, we designed a setup in which some participants created a plan before starting their search and others did not. Likewise, to create variance in the *quality* of metaknowledge, we split the participants who planned their search into two: those with and those without high-quality external information, provided in the form of a delegate list. Specifically,

² https://osf.io/tk4c2/?view_only=bec75f62ab0443cb982c842ae66ddd2a

participants in the “No Planning” condition did not engage in any planning but instead completed a short, unrelated questionnaire about the most and least enjoyable aspects of their current job; those in the “Autonomous Planning” condition were given a form on which to write the names of other participants who they believed, based on their own knowledge of others, might know the answer, or might point them in the right direction, while those in the “Assisted Planning” condition received the same form but were also supplied with a delegate list containing the names and project titles of the participating Umbrella researchers, which could provide valuable clues as to the possible identity of their search target. The delegate lists were retrieved before the start of the exercise. Table 2 summarizes our treatment conditions.

----- Insert Table 2 about and Figure 4 here -----

3.3.3 Third stage: during the game

The third stage was the interactive search exercise itself, lasting 45 minutes. We recorded the sequence of interactions in three ways. First, participants were provided with interaction tracking forms requiring them to record, chronologically and for each interaction, the IDs of all participants they talked to (see Figure 4); they could also indicate whether they asked their assigned question, and whether they were referred to someone else. Second, all interactions were video-recorded from multiple angles. All the participants wore brightly colored vests displaying their ID numbers on the front and back. Third, and most importantly, we used sociometric badges to record data about participants’ conversation partners (Kim, McFee, Olguin, Waber, & Pentland, 2012; Lane et al., 2020). These wearable devices were handed out before the game and recorded the signal strengths of nearby badges at 15-second intervals.

After finding the answer to their first question, participants were assigned a new question, such that they would remain in the game as targets. However, we restricted our analyses to

respondents' searches in answering their first questions, where our randomized treatment conditions exerted an effect.³

We recorded all instances in which individuals found their search target, including details of the timing. We define search effectiveness – the dependent variable in some of our analyses – in two ways. At the individual level of analysis, *success* refers to whether a participant found their first target before the end of the experiment. At the interaction level, we computed two measures to indicate how close the interaction brought the participant to success. First, the *proportion of instant wins* is the proportion of interactions of a specific type (i.e., the type of search micro-decision, see next section) that led directly to the target. Second, for the remaining interactions, the *proportion referral if not instant win* indicates the proportion of interactions of a given type that yielded a referral instead.

3.3.4 Fourth stage: after the game

At the end of the experiment, we asked participants to indicate, on a five-point scale, the extent to which they felt each of the following during the interactive session: excited, determined, enthusiastic, energized, ashamed, awkward, nervous, and stressed. Responses were averaged (with the latter four items reversed) to produce a single *positive affect* variable (Cronbach's alpha = 0.72). We also asked participants how difficult they found the exercise, using the five-part NASA-TLX instrument (Hart & Staveland, 1988) to measure *perceived difficulty* (Cronbach's alpha = 0.60) in terms of mental and temporal demand, effort required, frustration level, and perceived performance. Albeit limited in scope, the inclusion of these variables provided some insight into how participants experienced the event.

³ We omitted two respondents from our analyses because they wrongly claimed to have found their target. We also excluded three participants whose sociometric badges malfunctioned, because their interactions could not be tracked reliably.

3.4 Data processing

The raw sociometric badge dataset consisted of all the signal strengths between wearable badges at each 15-second interval throughout the game (including null signal strengths, when a certain other badge was out of range). Following extensive cleaning of the dataset (such as removing data from malfunctioning or unused badges), we identified the parties to, and duration of, each interaction between participants. To increase the reliability and precision of the badge data, we triangulated these data with the paper-based tracking forms and the video data. Doing so, we created a person/timestamp-level dataset that, for each individual, indicated whether, at any given time, they were “idle” or “interacting” and, in the latter case, with whom. This triangulation allowed us to symmetrize the dataset, such that each conversation was reported in relation to both alters with identical timestamps. For more details on the dataset construction process, along with examples from the data, see Appendix A.

4. DERIVING A TAXONOMY OF SEARCH MICRO-DECISIONS

We began our interpretation of the data by creating a taxonomy of the full behavioral repertoire of search micro-decisions from ego’s perspective. We define a search micro-decision as the decision by a focal individual (ego) to either initiate an interaction with another participant (alter) or to accept the start of an interaction when approached by another participant (alter). The objective of this taxonomy is to capture the rationale behind why ego starts or accepts a given interaction, inferred from clues in our data as to who likely initiated the interaction and for what reason. These clues include the plans participants created prior to the game (where applicable), the received referrals reported on their tracking forms, and the patterns within the temporal or spatial data from the sociometric badges.

Specifically, as a first step, we compiled an interaction-level dataset that listed the sequence

of interactions for each participant (such that each interaction was reported both ways). Alongside each interaction, we registered “clues” such as whether ego and alter knew each other beforehand, whether ego had mentioned the alter on their plan and vice versa, whether ego had received a referral to the alter and vice versa, whether ego happened to be nearby when the alter finished their previous conversation and vice versa, whether ego and/or alter asked their assigned question, how long they had been “idle” (not talking to anyone) before starting the conversation, and whether ego had likely been waiting for the alter to become available, or vice versa.

As a second step, based on this information, two of the authors manually coded each interaction in terms of how the interaction came about, using codes such as “immediate switch” (short time between interactions for ego), “follows referral,” or “quick turn” (ego starts conversation immediately with a person that is standing nearby at the end of their previous conversation). As a final step, the authors, through discussion, agreed on a final, simplified coding scheme based on logical rules (see Appendix B). For example, we considered a participant to be making an “ad hoc” decision in initiating an interaction if they were not waiting on someone else, asked their own question, and at least one of the following was true: 1) the participant initiated the current interaction very shortly after finishing their previous one; 2) the current interaction partner was physically proximate at the end of the previous interaction; 3) the participant was aware of the current interaction partner's research. We used this coding scheme for both parties in each interaction and ensured the codes were consistent in terms of initiation.

Our efforts resulted in five kinds of search micro-decisions, as well as two residual types. In turn, these behaviors can be grouped into three main search strategies. These three strategies, and their components, are discussed in greater detail below. Figure 5 summarizes the taxonomy and Appendix B details the coding scheme.

----- Insert Figure 5 about here -----

4.1 Attribute-based search

The concept of attribute-based search builds on extant theory on small-world search chains and network search (Adamic & Adar, 2005; Schnettler, 2009). Work in this area has found that, owing to the small-world structure of human social networks (Travers & Milgram, 1977; Uzzi, Amaral, & Reed-Tsochas, 2007; Uzzi & Spiro, 2005), and the tendency of people to cluster on the basis of similar attributes (Ertug, Brennecke, Kovacs, & Zou, 2021; Kleinbaum, Stuart, & Tushman, 2013; McPherson et al., 2001), an efficient way to search such networks is by approaching those with similar attributes to one's target (Adamic & Adar, 2005; Killworth, McCarty, Bernard, & House, 2006; Singh et al., 2010), such as their area of expertise. It is a direct and instrumental strategy which, in the context of our study, takes two forms. Thus, "Follows plan" (P) refers to ego-initiated interactions with a person whose name ego previously wrote down as part of their plan; naturally, such interactions were not possible for participants in the No Planning treatment condition. "Follows referral" (R) indicates ego-initiated interactions with alters suggested to ego by previous conversation partners.

4.2 Random search

Random search is an unplanned, indirect type of search, whereby individuals approach others based on social circumstance and convenience (e.g., a person happens to be nearby), rather than concrete clues. Although it may appear to be a non-strategy, such search appears more "natural" and, unlike attribute-based search, carries no risk of being seen as objectifying others (Bensaou et al., 2014; Casciaro et al., 2014). We delineate two forms of random search. An "Ad hoc interaction" (A) is ego-initiated, and typically quick and impulsive. We relied heavily on our sociometric badge data to identify these interactions. Specifically, we coded an interaction as being

ad hoc from ego's perspective if neither ego nor alter initiated the interaction on the basis of their plan or a referral, and ego exhibited certain behaviors indicative of ad hoc initiation while alter did not (see Appendix B for more details).

Our second form of random search is a "Miscellaneous interaction" (M), referring to an interaction of unclear initiation. This type of interaction typically arose when both ego and alter found themselves momentarily idle and, likely in the absence of more deliberate alternatives such as pursuing their plan or following up a referral, simply started interacting. M-coded interactions are treated as symmetric in that they are coded as "M" for both ego and alter.

4.3 Reciprocal search

In line with the tit-for-tat logic of general reciprocity (Falk & Fischbacher, 2006), we found some participants engaged in a search strategy that was neither as direct and instrumental as attribute-based search, nor as aimless and itinerant as random search. Instead, reciprocal search combined the purposefulness of attribute-based search with the social acceptability and naturalness of random search. We use the term "reciprocal search" to describe instances in which an individual lets another initiate the interaction, helps them first, and only afterwards asks for a favor in return.

In cases where alter initiated the conversation (i.e., alter coded as P, R, or A), ego had two options: to "Take a chance" (T) and ask their question after the alter had finished asking theirs, or to "Help only" (H), that is, to not ask their question and only answer that of the alter. We regard the former as reciprocal search, whereas the latter does not form part of ego's search and is considered a residual category. Finally, a further residual category, "Other interaction" (O), refers to those instances in which neither party reported having asked their question, and badge data was either inconclusive or missing; we excluded such interactions from our analyses. Of all interactions, 18.4 percent were coded as such. There were no significant differences in the

incidence rates of “Other interactions” between the treatment conditions.

5. RESULTS

5.1 Experiment validity checks

Table 3 reports the descriptive statistics for the population and their correlations. Prior to the exercise, participants claimed to know, on average, 7.8 other participants, and about the research of 7.4 of them. Symmetrization of ties resulted in a mean *degree centrality* of 9.7 contacts. During the planning stage, participants in the Assisted Planning and Autonomous Planning conditions mentioned an average of 2.4 names. A manipulation check showed that those in the Assisted Planning condition (mean = 3.2; N = 21) mentioned more names than those in the Autonomous Planning condition (mean = 1.5; N = 21; $p < 0.001$). We also found that the provision of a delegate list with project titles allowed participants in the Assisted Planning condition to activate much sparser networks (symmetrized recognition network density = 0.19; N = 19) than those in the Autonomous Planning condition (density = 0.79; N = 8; $p < 0.001$), suggesting they were better able to identify potential targets from beyond their own social circle. Further, while 67 percent of those in the Assisted Planning condition included their correct target within their plan, only 19 percent of Autonomous Planners did (difference significant at the $p < 0.001$ level). Nevertheless, delegate lists were not the only source of high-quality metaknowledge. It could also be sourced from one’s preexisting network, as evidenced by a significantly higher network degree centrality on the part of those whose plan included their correct target (mean = 11.5) than for those whose plan did not (mean = 7.2; diff. sig. $p < 0.05$).

----- Insert Tables 3 and 4 about here -----

Although assignment to treatment conditions was random, *t*-tests revealed that participants in the No Planning condition had higher levels of self-monitoring and perceived self-efficacy (both

significant at the $p < 0.05$ level) than those in the other two conditions combined (see Table 4). However, assuming that both traits make it easier to locate the target (cf. Bandura, 1982; Mehra, Kilduff, & Brass, 2001), this difference between treatment conditions would work against the premise that those unable to engage in attribute-based search – that is, No Planners – would have greater difficulty in locating their target. We did not find any significant differences between the treatment conditions in terms of other personality and cognition variables or individual attributes.

The observed frequency of each of the six search micro-decisions, for all participants as well as per treatment group, are presented in Table 5. The high proportion of Help-only behaviors (34%) among all participants showed that participants understood the purpose of the game and were, in general, incentivized not to waste time asking their assigned question when they did not perceive a high enough likelihood of receiving a satisfactory response (i.e., of finding their interaction partner to be their target, or receiving a relevant referral). We will interpret the incident rates of the other micro-decisions in the next stage of our analysis.

Confirming our intuition that the quality of participants' metaknowledge affects their search effectiveness, we found that those relying on higher-quality knowledge tended to be more successful in finding their target than those lacking such knowledge. We observed this difference at two levels of analysis. At the interaction level, we assessed the micro-decisions associated with search effectiveness by comparing, across treatment conditions, the usefulness of interactions for conveying information leading to the target. We found that attribute-based search (P, R), which relied on metaknowledge, was more likely than random (A, M) or reciprocal (T) search to lead to the target in a single step (see Figure 6a): whereas the proportion of instant wins for attribute-based search actions was 29.4 percent, it was only 7.2 percent for random search actions and 2.4 percent for reciprocal ones. The difference is significant at the $p < 0.001$ level (P, R vs. A, M, T).

Critically, at the individual level, the picture appeared more nuanced, as here we could see differences not only between those who planned their search and those who did not, but also between those who, by way of their respective treatment groups, relied on metaknowledge of differing quality. As Table 6 shows, 85.7 percent of participants in the Assisted Planning condition reached their target before the end of the exercise, a significantly higher share than those in either the No Planning (mean = 68.2 percent; $p < 0.10$) or Autonomous Planning (mean = 66.7 percent; $p < 0.10$) conditions. This suggests that, while the objectively useful and high-quality metaknowledge provided by the delegate list helped participants in their search for experts (i.e., Assisted Planning vs. Autonomous Planning or No Planning), planning based solely on the participants' own metaknowledge (i.e., Autonomous Planning vs. No Planning) did not. In fact, we found that the delegate list was useful only insofar as participants managed to identify relevant information: if the resulting plans of the Assisted Planners did not include their target, then their chances of success in the exercise (0.59) were on a par with those of Autonomous Planners (0.59).

When it comes to the role of planning in influencing the choice of strategy, we found marked differences in participants' propensities to follow their plans: Assisted Planners (mean = 0.41) were much more likely to do so than Autonomous Planners (mean = 0.14; diff. sig. at $p < 0.01$) (see Figure 7a). While the act of planning made metaknowledge more salient for both Assisted and Autonomous Planners, the obvious difference in the quality of the metaknowledge on which planning was based made metaknowledge sourced from the delegate list especially salient. Participants in the Assisted Planning condition seemed cognizant of the superior quality of their metaknowledge and were therefore more likely to follow their plan than those who planned on the basis of their own, inferior metaknowledge.

----- Insert Tables 5 and -6 and Figures 6-7 about here -----

5.2 Reciprocal search: its value

With respect to reciprocal search, our study yielded some intriguing findings. As mentioned earlier, reciprocity (and, by extension, the role of alter) matters for information search, because asking for advice amounts to soliciting favors. As such, alter's willingness to share is paramount to the success of such endeavors (Levin & Cross, 2004). This may be especially important in cases where ego does not have high-quality metaknowledge to rely on, and must instead forage for information using social exchange or, more specifically, referrals – a common occurrence at networking events and in organizations where metaknowledge of others is typically distributed unevenly (Singh et al., 2010).

Among interactions that did not lead to the target in a single step, we observed marked differences in the number of referrals received (see Figure 6b). Specifically, we found that reciprocal search yielded more referrals (75.6 percent) than random search (25.5 percent; T vs. AM, $p < 0.001$). In fact, the referral rate of take-a-chance (T) interactions was significantly higher than that of *any* other interaction type (diff. T vs. PRAMH, at least $p < 0.05$).⁴ Thus, it appears that alters were more willing to invest time and energy in providing a referral if ego had just helped them with their search, a manifestation of direct reciprocity (Nowak, 2006; Trivers, 1971). It is worth noting that this greater willingness to refer after receiving help was observed even in a relatively artificial setting such as ours, where the nature of the task meant that a certain degree of instrumentality was to be expected. By implication, the effect of the direct reciprocity manifested here may be even stronger in real-life social contexts, in which instrumental search behaviors may be less easily tolerated.

5.3 Reciprocal search: its neglect

⁴ Differences in the value of referrals (in terms of success in leading to the target) were not significant between alters from different treatment groups.

We also found that participants who engaged in planning before the event (i.e., Assisted Planners and Autonomous Planners) pursued reciprocal search behaviors less frequently than those who did not (i.e., No Planners) (see Figure 7b). That is, when approached unexpectedly by an alter, and thus faced with the decision of whether to “take a chance” and ask their question after helping that person (i.e., T vs. H), No Planners took a chance, on average, 37.3% of the time, as compared to 21.3% and 19.9% for, respectively, Autonomous and Assisted Planners (diff. sig. $p < 0.05$). While it is not very surprising that those acting on the basis of high-quality metaknowledge (i.e., Assisted Planners) saw little value in spending time on such unpredictable endeavors, there is less reason for Autonomous Planners not to do so. Similar to those of No Planners, the actions of Autonomous Planners were based solely on their own intuitions and own metaknowledge of others. Nonetheless, the act of planning appeared to fixate the Autonomous Planners on an agentic form of behavior that tended to preclude reciprocal search. That is, they no longer appeared to recognize the potential in taking a chance and asking their question when the opportunity presented itself. As such, they missed out on the higher referral yield afforded by such interactions. This may be an important contributing factor to the observation that Autonomous Planners were no more successful in locating their target than No Planners.

5.5 Robustness checks and additional analyses

We ran several additional analyses to gauge the robustness of our results. We began by investigating whether the higher number of referrals yielded by take-a-chance (T) interactions was restricted to certain participants. We ran a logistic regression analysis with the provision of a referral (1: yes; 0: no) as the dependent variable and take-a-chance interaction (1: yes; 0: any other interaction) as the independent variable. We included fixed effects for ego and alter. We found the effect was robust to participant variation ($b = 3.17, p < 0.001$). This implies that the higher

incidence of referrals during take-a-chance interactions was unlikely to be due to factors related to ego personality or appearance, nor to the possibility that alters known to be helpful were asked for referrals more frequently.

Next, we delved more deeply into the mechanisms behind this higher referral yield for Take-a-chance (T) interactions. To reiterate, our reasoning was that those who received help in their search efforts would be more likely to want to return the favor. However, a plausible alternative explanation might be that while an alter was asking for ego's advice, ego had an opportunity to gauge the alter's relevance to their own search goals, allowing for a more informed judgment of whether the alter's advice would be worth soliciting. If this explanation applies, the underlying theoretical mechanism would not be one of direct reciprocity, but of alter selection. We investigated this possibility in two ways. First, we compared the relative usefulness of referrals (i.e., whether they directly or indirectly led ego to the target) obtained from Ad hoc (A) and Take-a-chance (T) interactions. Because Ad hoc interactions do not allow ego to pre-assess an alter's relevance, a referral usefulness significantly higher for Take-a-chance than for Ad hoc interactions could indicate a possible selection effect; however, a *t*-test showed that the difference was not significant ($p = 0.78$). Second, we checked whether the likelihood of a referral from Take-a-chance interactions was significantly and positively correlated with self-efficacy, which would suggest that a referral was not received as a result of the alter's goodwill but was attributable to ego's more active and assertive request for it; again, the correlation was not significant ($r = -0.08, p = 0.64$).

Finally, we examined patterns in respondents' affective responses to the exercise, as well as in their reports of its perceived difficulty. Overall – and as seemed apparent during the experiment – the networking exercise was seen as a pleasant experience by most participants. The mean value for the four positive emotions was 3.9 (s.d. = 0.73), while that of the negative emotions

was much lower (mean = 1.6, s.d. = 0.65). These affective responses appear to have been influenced by participants' relative affinity for, or aversion to, such social settings, as evidenced by the positive correlation between positive affect and sociability ($r = 0.61, p < 0.001$). However, the way in which participants experienced the event also seems to have been affected by the nature of their interactions. Having averaged, for each participant, the frequency of the different types of alter micro-decisions, we ran linear regression analyses with positive affect as the dependent variable, adding sociability as a control. The results showed that participants whose alters engaged in more Take-a-chance interactions (i.e., more reciprocal search) had a more positive emotional experience ($b = 1.34, p < 0.01$). Further, we found a positive correlation between alters' Take-a-chance interaction frequency and participant satisfaction ($r = 0.40, p < 0.01$), and a negative one between this frequency and participant frustration ($r = -0.30, p < 0.05$). These results corroborate our argument that reciprocal search may provide a means for individuals to circumvent the perceived social cost of more exploitative direct search behaviors. Acting in line with the norms of reciprocity appears to leave both parties to an exchange feeling more satisfied, in contrast to the feelings of guilt and shame associated with violating such norms (Elster, 1989).

6. DISCUSSION

In this paper we sought to explore the repertoire of search strategies that individuals employ when searching for expertise at networking events, and to understand the performance implications of these strategies. Our intuition was that the quality and salience of individuals' metaknowledge is a key factor in determining both the value of different strategies and participants' propensities to adopt them. Given the nascent nature of the field of inquiry that deals with networking strategies – specifically, the lack of an established conceptual toolbox to describe the micro-decisions individuals make when interacting at events – we chose an explorative experimental approach.

This allowed us not only to uncover a broad spectrum of search micro-decisions, but also to infer causal relationships. We designed an interactive expert search game, in which participants – researchers at a pharmaceutical company – simultaneously acted as seekers and holders of target expertise. Our main findings are two-fold: letting others approach yields more referrals than taking the initiative in starting conversations, and exercising forethought in the form of planning increases the tendency to assert control in initiating conversations. Together, these two findings explain why some participants engaged in behaviors that proved ineffective. In this section, we formulate propositions that summarize and interpret our findings, and articulate how these insights contribute to our understanding of expertise search and interaction dynamics at events.

6.1 The referral premium of reciprocal search

Our first main finding is that by asking one’s question to someone only after first helping them, an individual gained access to a higher referral yield. Thus, individuals lacking high-quality metaknowledge of other participants could resort to a strategy that was superior to random search: namely, reciprocal search.

The social norm of reciprocity is an important principle guiding social exchange (Gouldner, 1960; Nai, Lin, Kotha, & Vissa, 2021; Schwartz, 1977; Trivers, 1971). Anthropological research highlights the role of giving and returning gifts in the maintenance of social cohesion (Mauss, 1925). More recently, reciprocity has been shown to facilitate, for example, mutual learning in teams (Myers, 2021). Thus, direct reciprocity aids coordination and solidarity (Blau, 1964; Grant, 2013; Mauss, 1925; Portes, 1998) because individuals are more eager to help those who have previously helped them and, conversely, might withhold information if there is no basis of goodwill and/or social norms of reciprocity are perceived to have been violated (Axelrod & Hamilton, 1981; Falk & Fischbacher, 2006).

Our research suggests that individuals in event settings are instinctively aware of the norms and social sanctions of reciprocity. The “compelling and coercive power” (Durkheim, 1938: 51) of these norms is likely to be amplified in social contexts such as networking events where individual actions are highly visible to others. For this reason, people often feel an aversion to acting in ways that might be perceived as overtly instrumental, and thereby exploitative of others (Bensaou et al., 2014; Casciaro et al., 2014; Kuwabara et al., 2016). While some degree of instrumentality might be understood to be an intrinsic part of networking, an overly direct approach can be considered socially undesirable, because it objectifies others and treats them merely as a means to an end (Casciaro et al., 2014). Such behavior may violate the unwritten norms of reciprocity, and social sanctions against such “free riders” might be quick to surface (Gintis, Bowles, Boyd, & Fehr, 2003). Thus, guided by their interaction scripts (Collins, 2014), individuals will make an effort to “preserve face” (Goffman, 1967) and act in a way that is socially acceptable (Lee, Mazmanian, & Perlow, 2020; Schwartz, 1977), because violating accepted norms can prompt feelings of embarrassment, guilt, and shame (Elster, 1989; Goffman, 1967). A more indirect, “natural” form of search, such as letting others initiate interactions, may be more effective in securing the goodwill necessary to access others’ expertise than the pragmatic and to-the-point approach characteristic of attribute-based search and random search. A reciprocal search strategy may be an example of what Engel et al. (2017: 44) refer to as “intelligent altruism,” which is “neither extremely selfless nor completely opportunistic.” Entrepreneurs, for example, may recognize this logic, and aim to assist others in the hope of having their efforts rewarded in the future (Engel et al., 2017; Vissa, 2012). We summarize our insights as follows:

Proposition 1. *In the absence of high-quality metaknowledge about other participants at events, reciprocal search is more effective than random search in locating experts because it yields more referrals.*

6.2 Forethought and the Einstellung effect

Our second main finding is that those with low-quality metaknowledge, rendered “salient” by the act of planning, preferred to retain the initiative in relation to interactions despite their relative lack of reliable metaknowledge on which to act. Thus, they tended not to exploit unforeseen opportunities in the form of reciprocal search, at the expense of limiting the number of referrals received. In other words, while it is rational for individuals with high-quality metaknowledge to opt for a direct, attribute-based search approach, rationality fails to explain why those planning on the basis of low-quality knowledge would choose to neglect reciprocal search, particularly given the norms and sanctions of reciprocity discussed above. In line with research that demonstrates human vulnerability to cognitive biases (Gilovich, Griffin, & Kahneman, 2002), we observe that engaging in planning sets participants up for an agentic mode of search, which can reduce their ability to make “timely switches” (cf. Laureiro-Martínez, Brusoni, Canessa, & Zollo, 2015), that is, to alternate between retaining and relinquishing control in the initiation of conversations. This insight contributes to extant work on networking behavior by highlighting a potential pitfall in an otherwise promising networking practice: forethought and planning (Bandura, 2001).

The explanation we propose is that we are observing a manifestation of the Einstellung effect (Bilalić, McLeod, & Gobet, 2010; Gersick, 1994; Luchins, 1942). Engagement in planning may have predisposed participants to the assertion of control over the initiation of interactions, and thus to engage in a repetitive pattern of behavior characterized by first searching for a suitable partner, then asking their question of them, and thereafter moving on to the next person. This “successive, repetitious use of the same method” may have “blinded them to the possibility of a more direct and simple approach” (Luchins, 1942: 1), such as presents itself when they are unexpectedly approached by others. While the cognitive bias manifested in the Einstellung effect

is useful when finding solutions to familiar problems, “problem-solving failures caused by the Einstellung effect are the downside of [this] normally efficient cognitive mechanism” (Bilalić et al., 2010: 114). Such an explanation is in accordance with the findings of Sahai and Frese (2019), who have recently demonstrated the way in which the Einstellung effect hampers identification of business opportunities. Thus, the effect may pose a danger to individuals seeking to benefit from networking because individuals often plan who they wish to talk to before attending events (Vissa, 2012); if their knowledge of other participants is incomplete, they could fall prey to the tendency to maintain the initiative, thereby foregoing the greater referral yield of reciprocal search. To summarize:

Proposition 2. *At events, planning increases the tendency of individuals to take the initiative in approaching others, leading to a lower willingness of others to provide referrals, and thereby compromising search effectiveness when planning is based on low-quality metaknowledge about other participants.*

6.3 Theoretical contributions

Our findings contribute to our understanding of interactions and expertise search in two main ways. First, our work documents the micro-level decisions that underpin interaction dynamics in event settings. Specifically, individuals participating in events face two main choices: whether or not to assume control in initiating an interaction (i.e., choosing attribute-based or random/reciprocal search) and, in case of the former whether to act on metaknowledge of participants’ attributes in a targeted manner (i.e., attribute-based search) or to start conversations in a more haphazard fashion (i.e., random search), based on social circumstance and spontaneity. Although these strategies build on preexisting concepts and mechanisms, such as forethought, referral, attribute-based search, random search, and reciprocity (Adamic & Adar, 2005; Falk & Fischbacher, 2006; Schnettler, 2009; Singh et al., 2010; Uzzi, Amaral, & Reed-Tsochas, 2007), the taxonomy we

introduce offers a comprehensive overview of the repertoire of search decisions individuals make when navigating interactive social contexts.

Second, our findings demonstrate how individual and social factors jointly drive behavioral decisions and their effectiveness. Social factors were critical in driving the effectiveness of search actions in soliciting referrals. That is, social norms, such as those of reciprocity, make indirect search behaviors more effective than one might anticipate. In situations in which one is looking for something specific, it seems counterintuitive to relinquish control over who to turn to and instead accommodate random others in approaching you. In addition, in professional work settings where levels of generalized reciprocity can be expected to be high (Baker & Bulkley, 2014), individuals may also not necessarily expect that another's propensity to help them depends on direct reciprocity. At the same time, cognitive factors were also critical in driving the decisions and behaviors of participants; specifically, limits to individual cognition such as the Einstellung effect may prevent individuals from adopting those behaviors that will be most effective given the level of metaknowledge they have to inform their search and networking actions.

6.4 Limitations and future research

Our experimental design allowed us to observe expertise search with a high level of clarity, and to identify causal relationships between search strategies and search effectiveness at networking events. However, the inherent artificiality of our empirical setting means that certain elements of behavior observable “in the real world” could not be elicited in our setup. First, because our empirical context was a single-game setup, we were not able to observe any potential long-term repercussions of behavioral choices made during the game. In real life, favors (or their absence) are not forgotten so quickly, and accumulated goodwill – social capital – takes a long time to abate (Burt, 2000a; Kleinbaum, 2017). Thus, “selflessly” helping others may furnish longer-term

benefits in the form of returned favors. To investigate this possibility, future research could use a setup involving repeated games with relatively little time between them and study longer timescales to observe the extent to which providing help in earlier games makes alters more inclined to return favors in subsequent ones (cf. Fehr & Fischbacher, 2003).

Second, to accurately track information flow, we restricted interactions to two participants. In a non-experimental setting, people often converse in small groups of three or more (Ingram & Morris, 2007). This implies that the strategic decisions underlying search decisions at such events would be more complex than observed in our setting. Participants may, consciously or unconsciously, set the “pace” of their networking by choosing how long to remain in a group before moving on. Similarly, following the logic of the broadening versus deepening dichotomy described by Vissa (2012), participants may prefer either to join groups comprised of strangers or join groups that include people already known to them (cf. Ingram & Morris, 2007).

Finally, our research has sought to emulate how individuals use networking events to locate experts and search for specific expertise. Although we believe that searching for specific expertise at events is a widespread practice across a range of professional contexts, such as internal company workshops, professional conferences, and entrepreneurial meetups, we acknowledge that such events also fulfill broader purposes. For example, one important function is to encourage individuals to both broaden and deepen their network relations (Vissa, 2012). Further, events can assist individuals in accumulating information and gathering new knowledge in more organic ways than that of our empirical setup. Future research could broaden our understanding of information search and learning at networking events by using search tasks that are more ambiguous and open-ended than those we employed.

6.5 Practical implications

From a practical standpoint, our results suggest that networking at events is best viewed as a balancing act between planning and goal-directedness on the one hand, and helpfulness and flexibility on the other. With respect to the former, our study reaffirmed the importance of planning before the event (Vissa, 2012); that is, spending some time researching participants so as to use the available time efficiently. Event organizers could assist participants in their preparation by distributing delegate lists prior to an event, thereby increasing the salience of individual expertise. However, we would advise employees, managers, and entrepreneurs attending such events not to strive for full control of their time, and instead to make themselves available to others, providing them with their time and expertise. This is because, no matter how much time is spent planning, a plethora of unforeseen opportunities will always arise (Busch & Barkema, 2020). Further, as our results suggest, the best way to access the valuable expertise and network connections of others is not by taking, but by giving. Those who are generous with their time and knowledge will soon encounter reciprocal generosity in others (Grant, 2013). In fact, they may even feel they have more time themselves (Mogilner, 2012), and perceive networking itself to be a more pleasurable experience (Casciaro, Gino, & Kouchaki, 2016).

7. CONCLUSION

While the importance of networking for expertise search is well established (Singh et al., 2010), the activity still retains a poor reputation in the eyes of those who regard it as a self-serving, “dirty” activity (Bensaou et al., 2014; Casciaro et al., 2014). Emphasizing the potential returns of attribute-based instrumental networking actions does little to allay such concerns. However, we show that networking for expertise can, in fact, be both effective and socially acceptable if one temporarily surrenders one’s own agenda and focuses instead on helping others. In this way, in the words of the nineteenth-century freethinking orator Robert Green Ingersoll, “we rise by lifting others.”

REFERENCES

- Adamic, L., & Adar, E. (2005). How to search a social network. *Social Networks*, 27(3), 187–203.
- Adler, P. S., & Kwon, S. -W. (2000). Social capital: The good, the bad, and the ugly. In E. L. Lesser (Ed.), *Knowledge and social capital: Foundations and applications* (pp. 89–115). London: Routledge.
- Axelrod, R., & Hamilton, W. D. (1981). The evolution of cooperation. *Science*, 211(4489), 1390–1396.
- Baker, W. E., & Bulkley, N. (2014). Paying it forward vs. rewarding reputation: Mechanisms of generalized reciprocity. *Organization Science*, 25(5), 1493–1510.
- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37(2), 122–147.
- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, 52(1), 1–26.
- Bensaou, B. M., Galunic, C., & Jonczyk-Sédès, C. (2014). Players and purists: Networking strategies and agency of service professionals. *Organization Science*, 25(1), 29–56.
- Bilalić, M., McLeod, P., & Gobet, F. (2010). The mechanism of the Einstellung (set) effect: A pervasive source of cognitive bias. *Current Directions in Psychological Science*, 19(2), 111–115.
- Blau, P. M. (1964). *Exchange and power in social life*. New York, NY: John Wiley & Sons.
- Borgatti, S. P., & Cross, R. (2003). A relational view of information seeking and learning in social networks. *Management Science*, 49(4), 432–445.
- Brandon, D. P., & Hollingshead, A. B. (2004). Transactive memory systems in organizations: Matching tasks, expertise, and people. *Organization Science*, 15(6), 633–644.
- Brass, D. J., Galaskiewicz, J., Greve, H. R., & Tsai, W. P. (2004). Taking stock of networks and organizations: A multilevel perspective. *Academy of Management Journal*, 47(6), 795–817.
- Burt, R. S. (2000a). Decay functions. *Social Networks*, 22(1), 1–28.
- Burt, R. S. (2000b). The network structure of social capital. *Research in Organizational Behavior*, 22, 345–423.
- Burt, R. S. (2004). Structural holes and good ideas. *American Journal of Sociology*, 110(2), 349–399.
- Busch, C., & Barkema, H. (2022). Planned luck: How incubators can facilitate serendipity for nascent entrepreneurs through fostering network embeddedness. *Entrepreneurship Theory and Practice*, 46(4), 884–919.
- Casciaro, T., Gino, F., & Kouchaki, M. (2014). The contaminating effects of building instrumental ties: How networking can make us feel dirty. *Administrative Science Quarterly*, 59(4), 705–735.
- Casciaro, T., Gino, F., & Kouchaki, M. (2016). Learn to love networking. *Harvard Business Review*, 94(5), 104–107.
- Cheek, J. M., & Buss, A. H. (1981). Shyness and sociability. *Journal of Personality and Social Psychology*, 41(2), 330–339.
- Chen, G., Gully, S. M., & Eden, D. (2001). Validation of a new general self-efficacy scale. *Organizational Research Methods*, 4(1), 62–83.
- Collins, R. (2014). *Interaction ritual chains*. Princeton, NJ: Princeton University Press.
- Cooper, A. C., Folta, T. B., & Woo, C. (1995). Entrepreneurial information search. *Journal of Business Venturing*, 10(2), 107–120.
- Cross, R., Parker, A., Prusak, L., & Borgatti, S. P. (2002). Knowing what we know: Supporting knowledge creation and sharing in social networks. *Organisational Dynamics*, 30(2), 100–120.
- Durkheim, E. (1938). *The rules of sociological method*. Chicago, IL: University of Chicago Press.
- Dyer, J. H., Gregersen, H. B., & Christensen, C. (2008). Entrepreneur behaviors, opportunity recognition, and the origins of innovative ventures. *Strategic Entrepreneurship Journal*, 2(4), 317–338.
- Elster, J. (1989). Social norms and economic theory. *Journal of Economic Perspectives*, 3(4), 99–117.
- Emirbayer, M., & Goodwin, J. (1994). Network analysis, culture, and the problem of agency. *American Journal of Sociology*, 99(6), 1411–1454.
- Engel, Y., Kaandorp, M., & Elfring, T. (2017). Toward a dynamic process model of entrepreneurial networking under uncertainty. *Journal of Business Venturing*, 32(1), 35–51.

- Ertug, G., Brennecke, J., Kovacs, B., & Zou, T. (2022). What does homophily do? A review of the consequences of homophily. *Academy of Management Annals*, 16(1), 38–69
- Falk, A., & Fischbacher, U. (2006). A theory of reciprocity. *Games and Economic Behavior*, 54(2), 293–315.
- Fehr, E., & Fischbacher, U. (2003). The nature of human altruism. *Nature*, 425(6960), 785–791.
- Gangestad, S. W., & Snyder, M. (2000). Self-monitoring: Appraisal and reappraisal. *Psychological Bulletin*, 126(4), 530–555.
- Gargiulo, M., Ertug, G., & Galunic, C. (2009). The two faces of control: Network closure and individual performance among knowledge workers. *Administrative Science Quarterly*, 54(2), 299–333.
- Gersick, C. J. (1994). Pacing strategic change: The case of a new venture. *Academy of Management Journal*, 37(1), 9–45.
- Gilovich, T., Griffin, D., & Kahneman, D. (2002). *Heuristics and biases: The psychology of intuitive judgment*. Cambridge, U.K.: Cambridge University Press.
- Gintis, H., Bowles, S., Boyd, R., & Fehr, E. (2003). Explaining altruistic behavior in humans. *Evolution and Human Behavior*, 24(3), 153–172.
- Goffman, E. (1967). *Interaction ritual: Essays on face-to-face interaction*: Chicago, IL: Aldine.
- Gouldner, A. W. (1960). The norm of reciprocity: A preliminary statement. *American Sociological Review*, 25(2), 161–178.
- Granovetter, M. (1973). The strength of weak ties. *American Journal of Sociology*, 78(6), 1360–1380.
- Granovetter, M. (1974). *Getting a job*. Chicago, IL: University of Chicago Press.
- Grant, A. (2013). *Give and take: A revolutionary approach to success*: New York, NY: Viking.
- Gray, P. H., & Meister, D. B. (2004). Knowledge sourcing effectiveness. *Management Science*, 50(6), 821–834.
- Gulati, R., & Srivastava, S. B. (2014). Bringing agency back into network research: Constrained agency and network action. In D. J. Brass, G. Labianca, A. Mehra, D. S. Halgin, & S. P. Borgatti (Eds.) *Contemporary perspectives on organizational social networks (Research in the sociology of organizations, Vol. 40)* (pp. 73–93). Bingley, U.K.: Emerald Group.
- Hallen, B. L., & Eisenhardt, K. M. (2012). Catalyzing strategies and efficient tie formation: How entrepreneurial firms obtain investment ties. *Academy of Management Journal*, 55(1), 35–70.
- Hallen, B. L., Davis, J. P., & Murray, A. (2020). Entrepreneurial network evolution: Explicating the structural localism and agentic network change distinction. *Academy of Management Annals*, 14(2), 1067–1102.
- Hansen, M. T., Mors, M. L., & Løvås, B. (2005). Knowledge sharing in organizations: Multiple networks, multiple phases. *Academy of Management Journal*, 48(5), 776–793.
- Hart, S. G., & Staveland, L. E. (1988). Development of NASA-TLX (Task Load Index): Results of empirical and theoretical research. In P. A. Hancock, & N. Meshkati (Eds.), *Human mental workload (Advances in psychology, Vol. 52)* (pp. 139–183). Amsterdam, The Netherlands: North-Holland
- Ingram, P., & Morris, M. W. (2007). Do people mix at mixers? Structure, homophily, and the “life of the party”. *Administrative Science Quarterly*, 52(4), 558–585.
- Khattab, J., Van Knippenberg, D., Pieterse, A. N., & Hernandez, M. (2020). A network utilization perspective on the leadership advancement of minorities. *Academy of Management Review*, 45(1), 109–129.
- Kilduff, M., & Day, D. V. (1994). Do chameleons get ahead? The effects of self-monitoring on managerial careers. *Academy of Management Journal*, 37(4), 1047–1060.
- Kilduff, M., & Krackhardt, D. (2008). *Interpersonal networks in organizations: Cognition, personality, dynamics, and culture*. Cambridge, U.K.: Cambridge University Press.
- Killworth, P. D., & Bernard, H. R. (1978). The reversal small-world experiment. *Social Networks*, 1(2), 159–192.
- Killworth, P. D., McCarty, C., Bernard, H. R., & House, M. (2006). The accuracy of small world chains in social networks. *Social Networks*, 28(1), 85–96.

- Kim, T., McFee, E., Olguin, D. O., Waber, B., & Pentland, A. S. (2012). Sociometric badges: Using sensor technology to capture new forms of collaboration. *Journal of Organizational Behavior*, 33(3), 412–427.
- Kiss, A. N., Magee, F. L., Libaers, D., Barr, P. S., Robinson, J. M., Wang, T., Zachary, M. A., & Harbert, R. J. (2020). CEO cognitive flexibility, information search, and organizational ambidexterity. *Strategic Management Journal*, 41(12), 2200–2233.
- Kleinbaum, A. M. (2017). Reorganization and tie decay choices. *Management Science*, 64(5), 2219–2237.
- Kleinbaum, A. M., Jordan, A. H., & Audia, P. G. (2015). An altercentric perspective on the origins of brokerage in social networks: How perceived empathy moderates the self-monitoring effect. *Organization Science*, 26(4), 1226–1242.
- Kleinbaum, A. M., Stuart, T. E., & Tushman, M. L. (2013). Discretion within constraint: Homophily and structure in a formal organization. *Organization Science*, 24(5), 1316–1336.
- Krishnan, R., Cook, K. S., Kozhikode, R. K., & Schilke, O. (2021). An interaction ritual theory of social resource exchange: Evidence from a Silicon Valley accelerator. *Administrative Science Quarterly*, 66(3), 659–710.
- Kuwabara, K., Hildebrand, C., & Zou, X. (2016). Lay theories of networking: How laypeople's beliefs about networks affect their attitudes and engagement toward instrumental networking. *Academy of Management Review*, 43(1), 50–64.
- Lane, J. N., Ganguli, I., Gaule, P., Guinan, E., & Lakhani, K. R. (2021). Engineering serendipity: When does knowledge sharing lead to knowledge production? *Strategic Management Journal*, 42(6), 1215–1244.
- Laureiro-Martínez, D., & Brusoni, S. (2018). Cognitive flexibility and adaptive decision-making: Evidence from a laboratory study of expert decision makers. *Strategic Management Journal*, 39(4), 1031–1058.
- Laureiro-Martínez, D., Brusoni, S., Canessa, N., & Zollo, M. (2015). Understanding the exploration–exploitation dilemma: An fMRI study of attention control and decision-making performance. *Strategic Management Journal*, 36(3), 319–338.
- Lee, M. Y., Mazmanian, M., & Perlow, L. (2020). Fostering positive relational dynamics: The power of spaces and interaction scripts. *Academy of Management Journal*, 63(1), 96–123.
- Levin, D., & Cross, R. (2004). The strength of weak ties you can trust: The mediating role of trust in effective knowledge transfer. *Management Science*, 50(11), 1477–1490.
- Lewis, K. (2004). Knowledge and performance in knowledge-worker teams: A longitudinal study of transactive memory systems. *Management Science*, 50(11), 1519–1533.
- Luchins, A. S. (1942). Mechanization in problem solving: The effect of Einstellung. *Psychological Monographs*, 54(6), i–95.
- Martin, M. M., & Rubin, R. B. (1995). A new measure of cognitive flexibility. *Psychological Reports*, 76(2), 623–626.
- Matusik, J. G., Heidl, R., Hollenbeck, J. R., Yu, A., Lee, H. W., & Howe, M. (2019). Wearable bluetooth sensors for capturing relational variables and temporal variability in relationships: A construct validation study. *Journal of Applied Psychology*, 104(3), 357–387.
- Mauss, M. (1925). The gift: The form and reason for exchange in archaic societies. *L'Année Sociologique*.
- McDonald, M. L., Khanna, P., & Westphal, J. D. (2008). Getting them to think outside the circle: Corporate governance, CEOs' external advice networks, and firm performance. *Academy of Management Journal*, 51(3), 453–475.
- McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology*, 27(1), 415–444.
- Mehra, A., Kilduff, M., & Brass, D. J. (2001). The social networks of high and low self-monitors: Implications for workplace performance. *Administrative Science Quarterly*, 46(1), 121–146.
- Method, J. R., Rosado-Solomon, E. H., Downes, P. E., & Gabriel, A. S. (2021). Office chitchat as a social ritual: The uplifting yet distracting effects of daily small talk at work. *Academy of Management Journal*, 64(5), 1445–1471.

- Mogilner, C. (2012). You'll feel less rushed if you give time away. *Harvard Business Review*, 90(9), 28–29.
- Molm, L. D. (2010). The structure of reciprocity. *Social Psychology Quarterly*, 73(2), 119–131.
- Myers, C. G. (2021). Performance benefits of reciprocal vicarious learning in teams. *Academy of Management Journal*, 64(3), 926–947.
- Nai, J., Lin, Y., Kotha, R., & Vissa, B. (2022). A foot in the door: Field-experiments on entrepreneurs' network activation strategies for investor referrals. *Strategic Management Journal*, 43(2), 323–339.
- Nebus, J. (2006). Building collegial information networks: A theory of advice network generation. *Academy of Management Review*, 31(3), 615–637.
- Nowak, M. A. (2006). Five rules for the evolution of cooperation. *Science*, 314(5805), 1560–1563.
- Obstfeld, D. (2005). Social networks, the tertius iungens orientation, and involvement in innovation. *Administrative Science Quarterly*, 50(1), 100–130.
- Obukhova, E., & Kleinbaum, A. M. (2020). Scouting and schmoozing: A gender difference in networking during job search. *Academy of Management Discoveries*, 8(2), 203–223.
- Porter, C. M., & Woo, S. E. (2015). Untangling the networking phenomenon: A dynamic psychological perspective on how and why people network. *Journal of Management*, 41(5), 1477–1500.
- Portes, A. (1998). Social capital: Its origins and applications in modern sociology. *Annual Review of Sociology*, 24(1), 1–24.
- Rammstedt, B., & John, O. P. (2007). Measuring personality in one minute or less: A 10-item short version of the Big Five Inventory in English and German. *Journal of Research in Personality*, 41(1), 203–212.
- Sahai, R., & Frese, M. (2019). If you have a hammer, you only look for nails: The relationship between the Einstellung effect and business opportunity identification. *Journal of Small Business Management*, 57(3), 927–942.
- Schnettler, S. (2009). A structured overview of 50 years of small-world research. *Social Networks*, 31(3), 165–178.
- Schwartz, S. H. (1977). Normative influences on altruism. *Advances in Experimental Social Psychology*, 10(1), 221–279.
- Seibert, S. E., Kraimer, M. L., & Liden, R. C. (2001). A social capital theory of career success. *Academy of Management Journal*, 44(2), 219–237.
- Shipilov, A., Labianca, G., Kalnysh, V., & Kalnysh, Y. (2014). Network-building behavioral tendencies, range, and promotion speed. *Social Networks*, 39, 71–83.
- Singh, J., Hansen, M. T., & Podolny, J. M. (2010). The world is not small for everyone: Inequity in searching for knowledge in organizations. *Management Science*, 56(9), 1415–1438.
- Smith, E. B., Menon, T., & Thompson, L. (2012). Status differences in the cognitive activation of social networks. *Organization Science*, 23(1), 67–82.
- Spigel, B. (2017). The relational organization of entrepreneurial ecosystems. *Entrepreneurship Theory and Practice*, 41(1), 49–72.
- Stam, W. (2010). Industry event participation and network brokerage among entrepreneurial ventures. *Journal of Management Studies*, 47(4), 625–653.
- Stuart, T. E., & Sorenson, O. (2007). Strategic networks and entrepreneurial ventures. *Strategic Entrepreneurship Journal*, 1(3–4), 211–227.
- Tasselli, S., & Kilduff, M. (2021). Network agency. *Academy of Management Annals*, 15(1), 68–110.
- Travers, J., & Milgram, S. (1969). An experimental study of the small world problem. *Sociometry*, 32(4), 425–443.
- Trivers, R. L. (1971). The evolution of reciprocal altruism. *The Quarterly Review of Biology*, 46(1), 35–57.
- Uzzi, B., Amaral, L. A., & Reed-Tsochas, F. (2007). Small-world networks and management science research: A review. *European Management Review*, 4(2), 77–91.
- Uzzi, B., & Spiro, J. (2005). Collaboration and creativity: The small world problem. *American Journal of Sociology*, 111(2), 447–504.

- Vissa, B. (2012). Agency in action: Entrepreneurs' networking style and initiation of economic exchange. *Organization Science*, 23(2), 492–510.
- Watts, D. J., & Strogatz, S. H. (1998). Collective dynamics of 'small-world' networks. *Nature*, 393(6684), 440–442.
- Wu, L., Waber, B. N., Aral, S., Brynjolfsson, E., & Pentland, A. (2008). Mining face-to-face interaction networks using sociometric badges: Predicting productivity in an IT configuration task. Available at: <https://ssrn.com/abstract=1130251>.
- Ziegert, J. C., Knight, A. P., Resick, C. J., & Graham, K. A. (2022). Addressing performance tensions in multiteam systems: Balancing informal mechanisms of coordination within and between teams. *Academy of Management Journal*, 65(1), 158–185.

TABLES AND FIGURES

TABLE 1 Rules During the Experiment

Rule	Rationale
Participants were only allowed to talk in pairs	<ul style="list-style-type: none"> - Trace referrals and information flow with precision - Participants seeking to talk to a specific person already in conversation had the choice of waiting for that person to become available, or turning to someone else instead
At the start of each interaction, participants had to ask each other an icebreaker question (see Figure 2) before they could ask their assigned question	<ul style="list-style-type: none"> - Slow down the pace of the exchange - Attach a small “social cost” to each interaction - Make conversations seem more natural - Icebreaker “games” are often used in networking events to reduce initial awkwardness
When approached by someone else, participants had the choice of whether to ask their assigned question	<ul style="list-style-type: none"> - The objective of the game was to reach the target in the least number of steps (counted as the number of people to whom the assigned question is asked) - Participants could decide to only help alter, and not make the conversation part of their own search chain
Participants were required to pretend not to know the answers to any questions they did not themselves provide	<ul style="list-style-type: none"> - Each question should be linked to only one specific target
Participants who identified their search target had to submit it at the organizers’ desk	<ul style="list-style-type: none"> - The answer was time-stamped - Once they reached their target, participants were assigned a new question such that they remained in the game as targets

TABLE 2 Treatment Conditions

Treatment	Treatment description	Quality of metaknowledge of other participants	Salience of metaknowledge of other participants
No Planning	<ul style="list-style-type: none"> - No planning stage - Completed a questionnaire about their current job 	Low*	Low
Autonomous Planning	<ul style="list-style-type: none"> - Plan a strategy based on their own knowledge of the other participants 	Low*	High
Assisted Planning	<ul style="list-style-type: none"> - Provided with a delegate list with the titles of the projects of the other participants - Plan a strategy based on the delegate list plus their own knowledge of the other participants 	High	High

* The quality of metaknowledge varied according to participants’ centrality in the network of preexisting relations among attendees but is lower than that of those in the Assisted Planning condition, who received a delegate list.

TABLE 3 Descriptive Statistics and Correlations*

Variable	N**	Std.		Min	Max																												
		Mean	Dev.			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22						
1 Success	64	0.73	0.45	0	1	1.00																											
2 Positive affect	58	3.64	0.51	2.38	4.5	0.10	(0.72)																										
3 Perceived difficulty	60	5.70	1.26	2.6	8	-0.03	-0.00	(0.60)																									
4 Follows plan	64	0.16	0.25	0	1	0.27	0.27	0.07	1.00																								
5 Follows referral	64	0.12	0.14	0	0.5	-0.02	0.00	-0.12	-0.45	1.00																							
6 Ad hoc	64	0.17	0.20	0	1	0.01	-0.16	-0.14	-0.35	0.03	1.00																						
7 Miscellaneous	64	0.11	0.19	0	1	0.16	-0.12	-0.16	-0.14	0.02	-0.17	1.00																					
8 Take a chance	64	0.08	0.10	0	0.5	0.08	-0.18	-0.10	-0.33	0.17	-0.14	0.21	1.00																				
9 Help only	64	0.23	0.21	0	0.75	-0.28	0.06	0.22	-0.09	-0.22	-0.24	-0.47	-0.24	1.00																			
10 Sociability	59	12.83	3.37	4	19	-0.20	0.61	0.09	0.07	-0.10	-0.07	-0.28	0.10	0.12	(0.82)																		
11 Self-monitoring	59	8.15	2.99	1	16	-0.13	0.29	-0.14	-0.16	0.17	0.01	-0.07	0.10	0.13	0.17	(0.64)																	
12 Cognitive flexibility	61	52.05	5.43	34	65	0.16	0.34	0.05	-0.00	0.08	0.00	-0.21	-0.04	0.02	0.17	-0.09	(0.75)																
13 Self-efficacy	62	31.32	3.31	24	40	0.04	0.22	0.10	0.04	0.13	-0.13	-0.03	0.14	-0.18	0.09	0.03	0.38	(0.81)															
14 Network degree	64	9.72	7.45	0	31	0.20	-0.12	0.00	0.04	-0.06	-0.17	0.14	0.17	0.07	-0.13	-0.04	-0.21	-0.09	1.00														
15 Gender	64	0.25	0.44	0	1	0.02	-0.20	-0.29	-0.27	-0.17	0.13	-0.09	0.13	0.06	-0.18	0.15	0.09	0.09	-0.14	1.00													
16 Country	64	0.72	0.45	0	1	0.10	0.13	0.18	-0.03	-0.15	-0.10	0.14	0.16	-0.01	0.00	0.01	-0.17	0.06	0.28	-0.20	1.00												
17 Seniority	64	0.44	0.50	0	1	-0.11	-0.05	-0.22	0.18	-0.02	0.01	-0.02	-0.25	0.00	0.07	-0.09	0.03	-0.06	-0.21	0.07	-0.71	1.00											
18 Big Five: Extraversion	61	7.00	1.74	4	10	-0.35	0.43	-0.03	-0.07	0.01	0.01	-0.15	0.06	0.05	0.57	0.17	0.11	0.09	0.09	-0.16	0.12	-0.08	1.00										
19 Big Five: Agreeableness	59	7.80	1.26	5	10	-0.19	-0.10	-0.01	-0.20	0.07	0.16	-0.00	-0.00	-0.08	0.05	-0.25	0.14	0.06	0.03	0.02	0.16	0.02	0.26	1.00									
20 Big Five: Conscientiousness	61	3.95	1.48	2	8	0.13	0.13	-0.04	0.01	0.03	-0.09	-0.03	0.05	0.10	-0.03	0.41	-0.23	-0.38	-0.10	0.02	0.13	-0.28	-0.25	-0.43	1.00								
21 Big Five: Neuroticism	61	6.11	1.61	2	9	-0.10	-0.22	-0.12	-0.11	0.08	0.24	0.02	-0.14	0.01	-0.35	0.04	-0.27	-0.45	0.03	-0.01	0.00	-0.05	-0.13	0.18	0.24	1.00							
22 Big Five: Openness	61	6.75	1.49	3	10	-0.23	0.01	-0.17	0.11	0.09	-0.01	-0.12	0.05	0.04	0.03	-0.06	-0.08	-0.06	-0.20	0.14	-0.16	0.04	-0.08	-0.05	0.09	0.14	1.00						

* All correlations above strength |0.24| are significant at the $p < 0.05$ level. Interaction-level variables are shown as individual-level means. Where relevant, reliabilities (Cronbach's alphas) appear in parentheses on the diagonal.

** Sample sizes vary, for reasons of different treatment group inclusion and/or missing data.

TABLE 4 Differences Between Treatment Groups¹

Variable	Assisted Planning	Autonomous Planning	No Planning	<i>t</i> -test significance ²
Self-monitoring	7.20 (3.49)	8.45 (2.65)	8.84 (2.65)	0.05
Self-efficacy	31.43 (3.06)	29.90 (3.11)	32.57 (3.34)	0.01
Gender (male)	0.14 (0.36)	0.24 (0.44)	0.36 (0.49)	0.25
Sociability	13.24 (2.64)	12.53 (4.10)	12.68 (3.43)	0.26
Degree centrality	9.10 (7.53)	8.95 (7.22)	11.05 (7.74)	0.18
Cognitive flexibility	52.71 (4.26)	50.63 (7.06)	52.67 (4.77)	0.13

¹ Mean values, with standard deviations in parentheses.

² One-sided *t*-tests comparing highest and lowest values (except for gender, for which we use a chi-squared test).

TABLE 5 Observed Frequencies of Search Micro-decisions*

P = Planned; R = Follows referral; A = Ad hoc; M = Miscellaneous;
 T = Take a chance; H = Help only

Treatment group	Search micro-decision					
	P	R	A	M	T	H
All participants (N = 466)	53 (11%)	73 (16%)	98 (21%)	40 (9%)	42 (9%)	160 (34%)
No planning condition (N = 169)	n/a	32 (19%)	42 (25%)	12 (7%)	18 (11%)	65 (38%)
Autonomous planning condition (N = 161)	16 (10%)	34 (21%)	30 (19%)	17 (11%)	13 (8%)	51 (32%)
Assisted planning condition (N = 136)	37 (27%)	7 (5%)	26 (19%)	11 (8%)	11 (8%)	44 (32%)

* Excludes unclassified "Other interaction" (O). Relative proportions are shown in parentheses, rounded to the nearest percentage.

TABLE 6 Percentage Success in Locating the Target, by Treatment Condition (N = 64)

	(0) No Planning (N = 22)	(1) Autonomous Planning (N = 21)	(2) Assisted Planning (N = 21)	<i>t</i> -tests
Success	68.2	66.7	85.7	2 vs. 0/1; $p = 0.06$ 2 vs. 1; $p = 0.08$ 2 vs. 0; $p = 0.09$

FIGURE 1 Stages of the Study

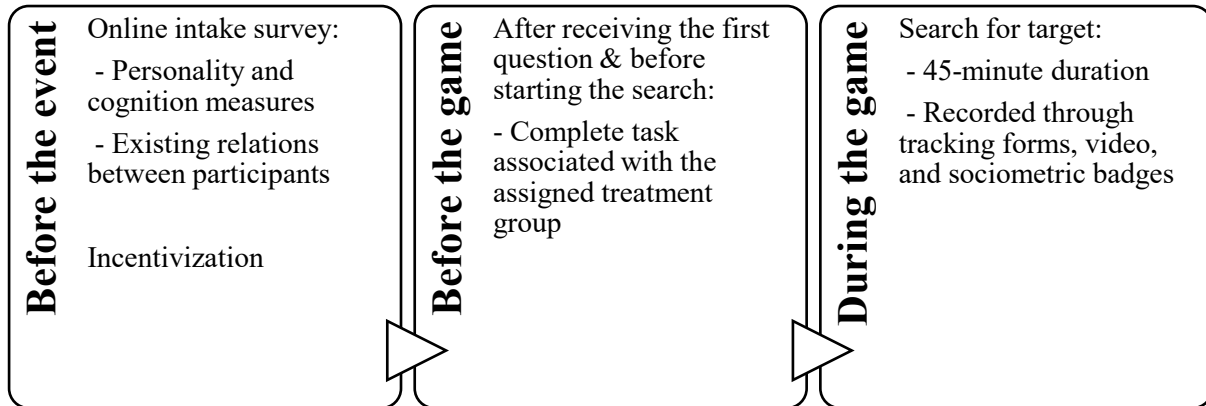


FIGURE 2 Symmetrized Recognition Network among Participants Prior to the Game

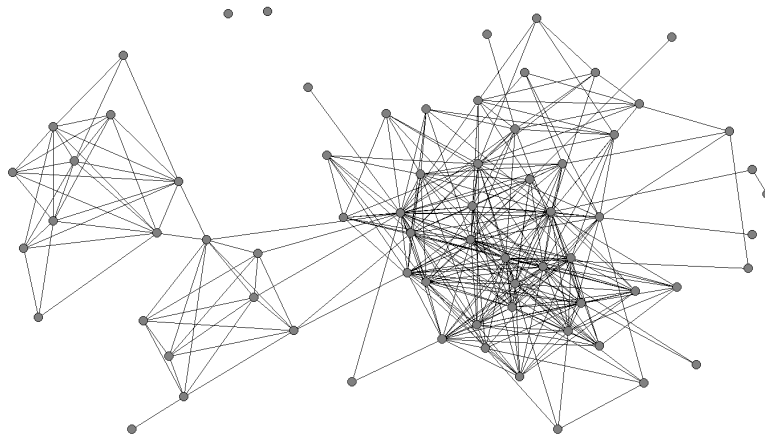


FIGURE 3 Example of a Multiple-choice Question

What is necessary but not sufficient for an immunogenic response?
<input type="checkbox"/> Bacteria and virus to be present
<input type="checkbox"/> MHC binding of peptides
<input type="checkbox"/> Pro-inflammatory cytokines
<input type="checkbox"/> Specific MHC alleles

FIGURE 4 Example Part of the Interaction Tracking Form

ID NUMBER OF SECOND PERSON YOU APPROACHED:

First ask the following filler question:
What is your morning ritual like?

Summary of the answer:

Did you ask this person your assigned question? Yes No

If so, did you find an answer to that question? Yes No
If the person is not sure about the answer, please indicate "No".

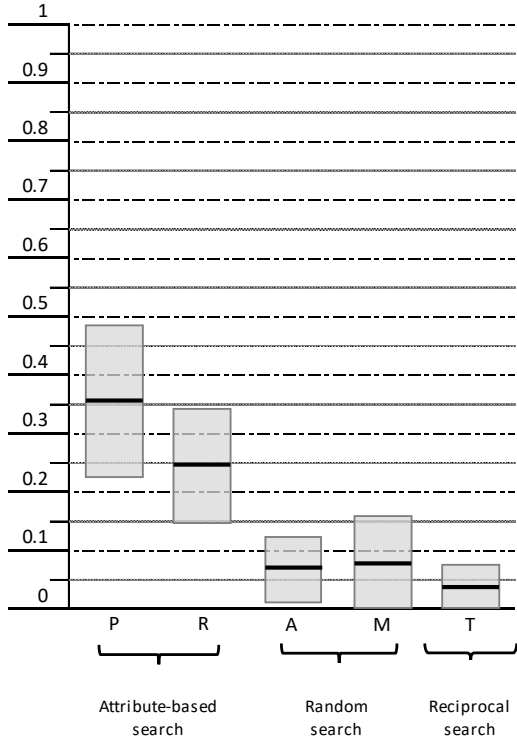
If not, did this person suggest you someone else you may approach? Yes, namely _____ No

FIGURE 5 Taxonomy of Search Micro-decisions in the Experiment

Code	Label	Approach	Initiation	Search	Description
P	Follows plan	Direct	Ego	Attribute-based	Ego approaches a person that is on the plan they created at the start of the experiment.
R	Follows referral	Direct	Ego	Attribute-based	Ego approaches a person they have been referred to previously during the game.
A	Ad hoc interaction	Indirect	Ego	Random	Ego approaches a person spontaneously, because they happen to be nearby and/or are available.
M	Miscellaneous	Indirect	Unclear	Random	Ego and alter start an interaction because they are nearby and both are available.
T	Takes chance	Indirect	Alter	Reciprocal	Alter initiates an interaction with ego ,and ego takes a chance and also asks their assigned question.
H	Helps only	Indirect	Alter	N/A	Alter initiates an interaction with ego, and ego decides to help alter but not ask their assigned question.
O	Other interaction	N/A	Unclear	N/A	Neither ego nor alter appear to initiate the conversation and neither ask their question.

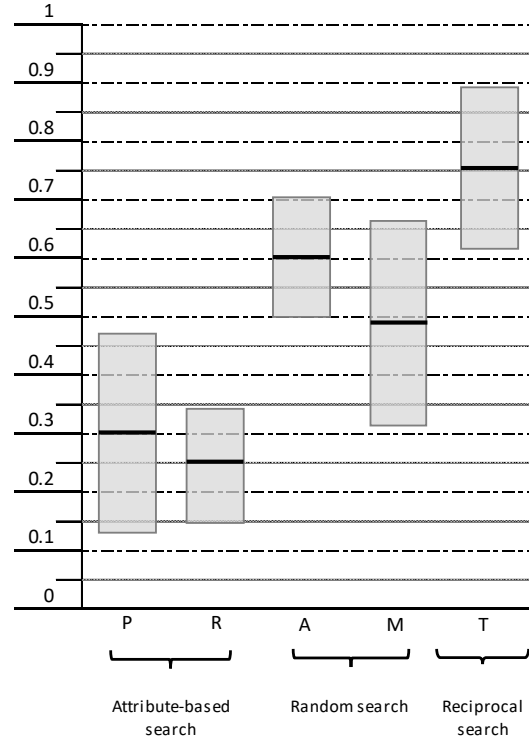
**FIGURE 6 Search Effectiveness –
How Different Micro-Search Decisions Directly (6a) or Indirectly (6b)
Contribute to Location of Target**

Fig. 6a: Proportion of instant wins, by micro-decision*



t-test:
proportion of instant wins (PR vs. AMT)
significant at the $p < 0.001$ level.

Fig. 6b: Proportion of referrals if not instant win, by micro-decision*



t-test:
proportion of referrals if not instant win (T vs. AM)
significant at the $p < 0.001$ level.

t-test:
proportion of referrals if not instant win (T vs. PRAM)
significant at the $p < 0.01$ level.

*Rectangles represent 95% confidence intervals, with the thick line in the middle signifying the mean.

Legend:

- P: Follows plan;
- R: Follows referral;
- A: Ad hoc;
- M: Miscellaneous;
- T: Take a chance;
- H: Help only [excluded: no chance of winning by design].

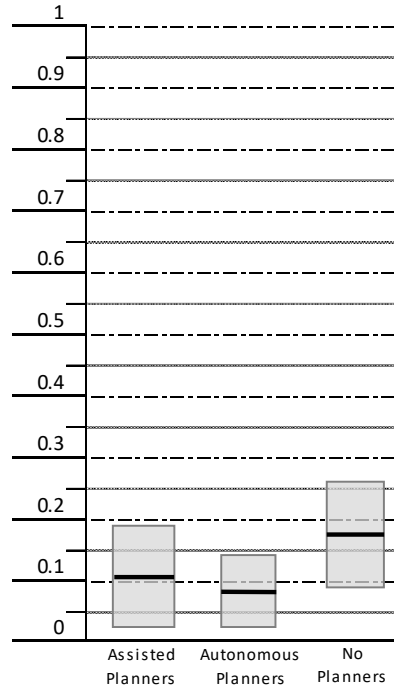
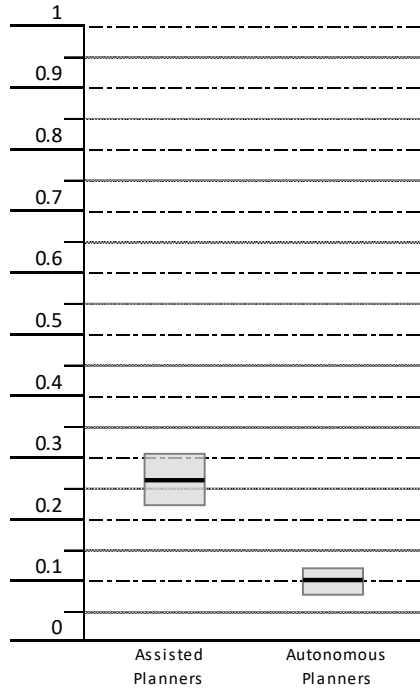
**FIGURE 7 Search Behaviors –
Individual Propensities to Engage in Attribute-based Search (7a)
and Reciprocal Search (7b), by Treatment Group**

Fig. 7a: Proportion of planned (P) relative to other micro-decisions (RAMTH)

Fig. 7b: Proportion of reciprocal (T) relative to random and Help-only decisions (AMH)

Assisted Planners vs. Autonomous Planners*

All treatment groups*



t-test:
proportion of observed P to RAMTH
Assisted Planners vs. Autonomous Planners
significant at the $p < 0.01$ level

t-test:
proportion of observed T to AMH
Assisted/Autonomous Planners vs. No Planners
significant at the $p < 0.05$ level

*Rectangles represent 95% confidence intervals, with the thick line in the middle signifying the mean.

Legend:
P: Follows plan;
R: Follows referral;
A: Ad hoc;
M: Miscellaneous;
T: Take a chance;
H: Help only.

APPENDIX A: Processing of Sociometric Badge Data

Step 1: Initial state of badge data

<p>We imported sociometric badge data in edgelist format: timestamp (15-second intervals); participant 1; participant 2; RSSI (Received Signal Strength Indicator) values between the two. This dataset included all observed signal strengths from each participant to every other participant within range. Here we see some of participant no. 7's RSSI values in relation to other participants; higher absolute values signify stronger signals.</p>	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr style="background-color: #f2f2f2;"> <th>time</th> <th>member1</th> <th>member2</th> <th>rsssi</th> </tr> </thead> <tbody> <tr><td>10:58:30</td><td>7</td><td>15</td><td>-61.28571</td></tr> <tr><td>10:58:30</td><td>7</td><td>6</td><td>-82</td></tr> <tr><td>10:58:30</td><td>7</td><td>73</td><td>-77</td></tr> <tr><td>10:58:45</td><td>7</td><td>28</td><td>-77</td></tr> <tr><td>10:58:45</td><td>7</td><td>30</td><td>-72.5</td></tr> <tr><td>10:58:45</td><td>7</td><td>59</td><td>-80.6</td></tr> <tr><td>10:58:45</td><td>7</td><td>63</td><td>-79</td></tr> </tbody> </table>	time	member1	member2	rsssi	10:58:30	7	15	-61.28571	10:58:30	7	6	-82	10:58:30	7	73	-77	10:58:45	7	28	-77	10:58:45	7	30	-72.5	10:58:45	7	59	-80.6	10:58:45	7	63	-79
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10:58:45	7	63	-79																														

Step 2: Data cleaning

<p>Removed data from unused badges, as well as from the badges that acted as beacons (i.e. receivers) in fixed locations.</p>

Step 3: Construction of (solely badge-based) interaction-level dataset

<p>We used each participant's strongest signal strengths at each timestamp to determine the closest participant, in sequential order. For example, participant A's closest alter, over sequential timestamps, could be BBBBCBBDDDEDDDD. We found that using 0.5 minutes as a cutoff for minimum conversation length produced the highest symmetry between ego and alter perspectives. Thus, in the above example, the removal of noise (C and E observations) creates two sequential interactions: BBBBBDDEDDDD, i.e., participant A interacted with participant B for six timestamps (1 minute and 30 seconds), then immediately with participant D for seven timestamps (1 minute and 45 seconds). In this example, participant no. 49 (ego) was most likely talking to participant no. 5 (alter), and the single instance of a high RSSI value in relation to participant no. 19 is only noise. It may have arisen from that person having moved close to ego for a short time, or be the result of ego's alter turning away from ego momentarily. By time 15:23:30, ego is already interacting with a new participant.</p>	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr style="background-color: #f2f2f2;"> <th>ego</th> <th>alter</th> <th>rsssi</th> <th>time</th> </tr> </thead> <tbody> <tr><td>49</td><td>11</td><td>-60</td><td>15:21:00</td></tr> <tr><td>49</td><td>5</td><td>-59</td><td>15:21:15</td></tr> <tr><td>49</td><td>5</td><td>-63</td><td>15:21:30</td></tr> <tr><td>49</td><td>19</td><td>-58.5</td><td>15:21:45</td></tr> <tr><td>49</td><td>5</td><td>-58.875</td><td>15:22:00</td></tr> <tr><td>49</td><td>5</td><td>-60.71429</td><td>15:22:15</td></tr> <tr><td>49</td><td>5</td><td>-57.63636</td><td>15:22:30</td></tr> <tr><td>49</td><td>5</td><td>-61</td><td>15:22:45</td></tr> <tr><td>49</td><td>5</td><td>-62.11111</td><td>15:23:00</td></tr> <tr><td>49</td><td>5</td><td>-58.5</td><td>15:23:15</td></tr> <tr><td>49</td><td>11</td><td>-62.5</td><td>15:23:30</td></tr> <tr><td>49</td><td>11</td><td>-62.5</td><td>15:23:45</td></tr> <tr><td>49</td><td>11</td><td>-61.28571</td><td>15:24:00</td></tr> </tbody> </table>	ego	alter	rsssi	time	49	11	-60	15:21:00	49	5	-59	15:21:15	49	5	-63	15:21:30	49	19	-58.5	15:21:45	49	5	-58.875	15:22:00	49	5	-60.71429	15:22:15	49	5	-57.63636	15:22:30	49	5	-61	15:22:45	49	5	-62.11111	15:23:00	49	5	-58.5	15:23:15	49	11	-62.5	15:23:30	49	11	-62.5	15:23:45	49	11	-61.28571	15:24:00
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Step 4: Cleaning tracking form data

<p>Participants occasionally forgot to fill in parts of their tracking forms, or made mistakes. We corrected these using a combination of common sense (e.g., if participant did not indicate whether or not they were referred to someone else, but did indicate the person they were referred to, then we knew they were indeed referred) and comparisons with badge and video data (e.g., while participant A claimed to have talked to participant B, participant B did not reciprocate, while participant D's tracking form and badge data both indicated that participant A had been talking to them at the time).</p>
--

Step 5: Merging tracking form and badge datasets (triangulation)

In most cases, we considered the tracking form data to be the benchmark onto which badge data were matched. Initially, 83% of interactions were reported symmetrically. We categorized the remaining 17% on a case-by-case basis using a variety of logic-based approaches. At the end of this stage, we had a fully symmetric interaction-level dataset (person-alter-sequence number). Note that sequence numbers were not symmetrical, because person A talking to person B may constitute A's second interaction, but the fourth for B.

Step 6: Re-expanding dataset to timestamp-level interactions

Here, we created a timestamp-level dataset, allowing us to identify the beginning and end of each interaction. Owing to the noise in the badge data, these times were symmetrical in only 89.7% of all cases. We symmetrized the remaining cases by taking into account the data of both interactants and that of every other relevant participant. This example shows ego no. 26 through a 5:45-minute time period. Alter no. 68 was probably close by, hence the short idle period between the two conversations.

ego	t	status	alter
26	527	idle	.
26	528	idle	.
26	529	interacting	27
26	530	interacting	27
26	531	interacting	27
26	532	interacting	27
26	533	interacting	27
26	534	interacting	27
26	535	idle	.
26	536	interacting	68
26	537	interacting	68
26	538	interacting	68
26	539	interacting	68
26	540	interacting	68
26	541	interacting	68
26	542	interacting	68
26	543	interacting	68
26	544	interacting	68
26	545	interacting	68
26	546	interacting	68
26	547	interacting	68
26	548	idle	.
26	549	idle	.

Step 7: Variable creation

Once the dataset was fully symmetrical, we created a large number of potentially relevant variables, taking into account all data sources: badges, tracking forms, planning, surveys and social networks. Further, it was at this stage that we categorized interactions into the components of our taxonomy.

Step 8: Final dataset prepared for analysis

We dropped two respondents because they claimed to have found their target, and moved on to the next, while the person they identified was, in fact, not their true target. We thus ended up with two versions of the same dataset: one at the level of the interaction, and another at the level of the individual. These data were used for the analyses reported in the paper. This section of the interaction-level dataset shows ego no. 50's first six interactions (seq_all = interaction sequence number). This person was in treatment group 2 (Assisted Planning). Following one Miscellaneous and one Help-only interaction, they talked to alter no. 10, whom they had planned to talk to. This conversation was followed by one Ad hoc interaction and two Help-only interactions.

ego	treatment_p	seq_all	alter	start_t	end_t	code
50	2	1	22	420	429	M
50	2	2	71	434	441	H
50	2	3	10	447	458	P
50	2	4	13	459	466	A
50	2	5	1	.	.	H
50	2	6	82	480	487	H

¹ We did not use a cutoff for signal strengths, as per the recommendations of Matusik et al. (2019). Note that we were not relying solely on badge signal data, because we also had tracking forms to help us identify interactions.

APPENDIX B: Coding Scheme for Search Micro-decisions

Ego	Alter	Ego				Alter			
		Planned	Referred	Ad hoc*	Asked question	Planned	Referred	Ad hoc	Asked question
Planned (P)**	Planned (P)	1				1			
Planned (P)	Take a chance (T)	1				0			1
Planned (P)	Help only (H)	1				0			0
Follows referral (R)	Follows referral (R)	0	1			0	1		
Follows referral (R)	Take a chance (T)	0	1			0	0		1
Follows referral (R)	Helps only (H)	0	1			0	0		0
Ad hoc (A) ***	Take a chance (T)	0	0	one or both = 1		0	0	0	1
Ad hoc (A)	Help only (H)	0	0	one or both = 1		0	0	0	0
Miscellaneous (M)	Miscellaneous (M)	0	0	one or both = 1		0	0	one or both = 1	
Dropped from analyses		0	0	0	0	0	0	0	0

* A participant is considered to making an ad hoc decision if they are not waiting on someone else, asked their own question, and at least one of the following is true: 1) the participant initiated the current interaction very shortly after finishing the previous one; 2) the current interaction partner was physically proximate at the end of the previous interaction; 3) the participant was aware of the current interaction partner's research.

** Interactions in which both parties were simultaneously following their plan and a referral (PP and RR, respectively) were very rare, comprising, in total, less than 1% of all interactions.

*** Includes cases where both parties asked their question, neither exhibited ad hoc signs, but the alter was waiting for someone else and was therefore not the initiator.