THE RECENCY EFFECT IN COGNITIVE NETWORK ACTIVATION

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Abstract:

The recency effect has been documented extensively in cognitive psychology yet has mostly been overlooked in the field of social networks. We use an online sample (n=214) to test how the recency effect manifests in cognitive network activation. Based on a social recall task in which participants are asked to list specific acquaintances, we find that people they had seen or thought about more recently came to mind earlier and more quickly, whilst dormant ties were rarely recalled. We discuss implications of our findings for future research, calling for greater incorporation of the recency effect in network scholarship.

INTRODUCTION

In the last three decades, a burgeoning stream of literature within social network research has moved beyond the traditional, sociologically driven "structuralist" approach towards one that incorporates individual psychology and cognition (Emirbayer and Goodwin, 1994), placing greater emphasis on the individual-level determinants of social networks (Hallen et al., 2020; Kilduff and Krackhardt, 2008; Mehra et al., 2001; Smith et al., 2020; Tasselli and Kilduff, 2020). An especially fruitful line of work has addressed the way in which social networks are recalled from memory (Brashears and Quintane, 2015; Janicik and Larrick, 2005; Smith et al., 2012). This research has shed light on the inherent imperfections of network recall, and the ways in which our minds are biased towards calling to mind certain network contacts, while forgetting others (Brewer, 2000; Smith et al., 2012).

Although this avenue of research has clear theoretical links to foundational work in cognitive psychology that deals with learning, memory, and recall (Capitani et al., 1992; Hills and Pachur, 2012; Murdock Jr, 1962), important synergies remain relatively unexploited. This shortcoming is most salient with respect to a recent and organizationally highly relevant area of inquiry under the umbrella of social recall research: cognitive network activation (Smith et al., 2012), the line of research concerned with understanding the process by which specific network contacts, i.e. those with certain attributes, come to mind. While this work has shed light on various biases that can affect how network contacts are recalled from memory (Menon and Smith, 2014; Smith et al., 2012), it thus far has remained virtually silent with respect to an especially prominent, well-researched and robust finding within the wider study of human memory: the recency effect.

The recency effect is the tendency of the human memory to prioritize the cognitive accessibility of recent items over older ones (Higgins, 1996; Zokaei et al., 2014). The effect stems from the oft-observed phenomenon that, having memorized a string of items, respondents are much more likely to recall items at the end of the list (i.e. those recently learned) as opposed to those learned earlier on (Capitani et al., 1992). With respect to cognitive network activation, the presence of a strong recency effect would imply that individuals more easily call to mind those they have thought about or seen more recently.

In this study, we ask to what extent the recency effect manifests in processes of cognitive network activation. We believe answering this question is important, as cognitive network activation is a critical precursor to the mobilization of network ties for advice, support or access to information (Smith et al., 2020). As such, cognitive processes that favor recent connections may potentially steer individuals away from considering alternative less recent, even dormant, connections that may – contingent on context – provide access to more useful inputs (cf. Burt, 2004; Levin et al., 2011).

To investigate the recency effect in cognitive network activation, we analyzed the social recall patterns of 214 respondents in an online sample. We designed our social recall task so as to resemble the process of cognitive network activation, by incorporating a filtering mechanism. That is, respondents are asked to search their minds for specific kinds of contacts, in our case people who wear glasses. This design choice was added to more closely mirror the process by which individuals browse for potential network contacts holding a specific attribute, which may differ from recalling items or people randomly. We deemed wearing glasses an ideally suited attribute for the study; as it is neutral, easily observable and pervasive, it allows us to incorporate an element of filtering anyone can relate to whilst taking care that other, more complex criteria (e.g. suitability of a person for a given task) would not confound our results.

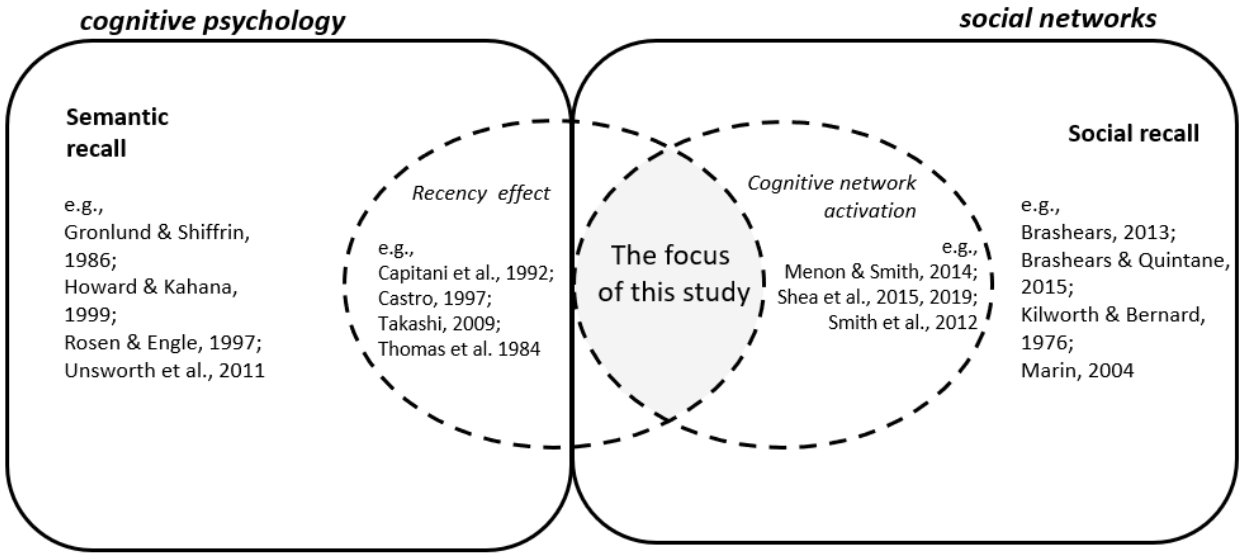
We find compelling evidence that the recency effect strongly influences cognitive network activation, and thus warrants further scholarly attention. We discuss the theoretical implications of our study and delineate potential avenues for future research incorporating the recency effect in the study of social networks. Building on the premise that cognitive network activation is a precursor to network mobilization for advice, support and information, we argue that the choice of who we turn to may not simply be a result of thoughtful consideration of availability, perceived competence, cost of access (Borgatti and Cross, 2003; Nebus, 2006), or of the emotional bond to that person (Casciaro and Lobo, 2008), but may be strongly and perhaps unduly biased in favor of recent ties. We also discuss the practical implications for networking, laying out how individuals may cultivate and maintain their network by mitigating potential undesirable consequences of the recency effect and by seeking to remain salient in the minds of others.

THEORY

As part of a general opening up in social network research towards greater exploration of the individual-level, cognitive underpinnings of networks and network action (Casciaro et al., 2015; Marineau et al., 2018; Tasselli and Kilduff, 2020), scholars in the field have investigated the way in which networks are learned (Freeman, 1992; Janicik and Larrick, 2005), stored in memory (Brands, 2013; Krackhardt, 1987), and finally retrieved (i.e. recalled) for various purposes (Brashears, 2013; Smith et al., 2012). The foundations of research into social recall can be traced back to the broader study of memory encoding, storage and retrieval processes in cognitive psychology and its early applications to the study of social networks (Baddeley, 1999; Bond Jr et al., 1985; Brewer, 1993; De Soto, 1960).

Within that spectrum of work, research on the cognitive psychology side – including, more broadly, neuroscience and experimental psychology – has sought to unravel the fundamentals of retrieval from memory (e.g., Gronlund and Shiffrin, 1986; Logie, 2007). The typical empirical approach used by these scholars is asking subjects to memorize a list of items (words or categories, but usually not people) presented to them in a certain order, then having them recall those items. The focus of these studies is the process of recall itself, therefore recalled items are treated as part of a sequence. Specifically, the main focus has been on the role of working memory in retrieval (Rosen and Engle, 1997), as well as on serial-order effects such as primacy and recency (Howard and Kahana, 1999; Unsworth et al., 2011). For a visual summary of these streams of research, see Figure 1.

Figure 1. A visual illustration of the relationship between our current research focus and the relevant streams of literature



Object of retrieval:	• facts, words, categories (semantic recall)[1]	• acquaintances (social recall)
Theoretical focus:	• the process of recall (viewed as a sequence)	• the end result of recall (viewed as a network)[2]
Typical empirical design:	• memorizing a set of items, then recalling them	• recalling acquaintances (without memorization)

[1] note exceptions (Hills and Pachur, 2012)
[2] note exceptions (Brewer, 1993; Brewer and Yang, 1994)

The focal point of the current study – the recency effect – was first observed as early as 1876 (Capitani et al., 1992; Nipher, 1878) and pertains to the phenomenon that, having memorized a string of items in a list, individuals tend to recall items at the end of the list with considerably less difficulty than those in the middle (Greene, 1986; Howard and Kahana, 1999; Murdock Jr, 1962)[1]. The effect has been attributed to the existence of two separate memory systems: one for long-term and one for short-term storage (Capitani et al., 1992). The general consensus is that the recency effect is a result of working memory keeping recent items more easily accessible (Sasaki, 2009).

Since its conception, the recency effect has been documented countless times (Capitani et al., 1992; Murdock Jr, 1962; Robinson and Brown, 1926; Zokaei et al., 2014). In fact, it highlights a mechanism so fundamental to cognitive functioning that it has even been demonstrated in multiple non-human species, including chimpanzees (Buchanan et al., 1981),

[1] Items at the beginning are also more easily recalled due to the so-called primacy effect (Capitani et al., 1992).

rhesus monkeys (Castro, 1997), pigeons (Thomas et al., 1984) and rats (Spear, 1971). Its purpose is seen as an attempt at maximizing efficiency in storage and recall; given our cognitive limitations, the mind must organize information in such a way that the potentially most relevant pieces are quickly and easily accessible (Anderson and Schooler, 1991). As the mind "bets" that recently acquired information is more likely to be needed in the future than older information, the result is an increased cognitive accessibility of recent items (Anderson and Schooler, 1991; Schooler and Hertwig, 2005).

Early applications of our understanding of memory encoding, storage and retrieval to the study of social networks have zoomed in onto the retrieval of social information, a process known as social recall[2] (Hills and Pachur, 2012; Kaess and Witryol, 1955). Work in this area has advanced our understanding of a range of cognitive heuristics that affect the way in which individuals navigate complex social worlds (Brewer, 2011; De Soto, 1960; Kilduff and Krackhardt, 2008), needed because remembering and maintaining all our relationships is well beyond our cognitive limitations (Brashears, 2013; Dunbar, 2008; McFadyen and Cannella, 2004). These heuristics have evolved for the sake of evolutionary fitness, allowing us to make decisions quickly and effortlessly (Gigerenzer and Brighton, 2009). This line of work has demonstrated that social memory itself is organized along network lines (Brewer, 1995). Specifically, recall happens in clusters of association, such that a person's salience is higher if that person is perceived to be tied to the previously recalled person (Hills and Pachur, 2012; cf. Smith et al., 2020). Although the entire process is also affected by a certain degree of noise (Thomson et al., 2015), the result of these forces is a string of names that stick together into clumps by the "gravity" of associative clustering[3].

Given its prominence in wider research on retrieval from memory in experimental cognitive psychology (Anderson et al., 1994; Kane and Engle, 2000) and neuroscience (e.g., Baddeley, 2003; Cabeza et al., 1997), it is surprising the recency effect has remained unexplored in the field of social networks. The reason may be that its manifestation in social recall may not be as clear-cut as one might expect.

[2] Occasionally referred to as "network recall" (Roth et al., 2021)

[3] The "clumping" of recalled items along lines of association is referred to as associative clustering in the field of cognitive psychology (e.g., Hills & Pachur, 2012); social network scholars tend to multiple terms referring to the size of the cluster, such as dyadic or triadic recall (e.g., Brashears & Quintane, 2015).

One the one hand, it has been argued that the cognitive processes underpinning the retrieval of social and non-social information are highly similar (Hills and Pachur, 2012), and thus one may expect the recency effect to play a similar role in social and non-social recall. At each point in time during a recall process, the salience of a given person may depend on how recently that person (or, more precisely, the idea of that person) has been in the respondent's working memory, such that more recently stored or accessed persons will be more salient (Anderson, 1983; Thomson et al., 2015). This salience may also be compounded by how frequently that memory has been accessed (Hills and Pachur, 2012), or by the strength of the emotional bond to the given person (Brewer and Webster, 2000; Marin, 2004). Thus, for any given purpose, individuals who are fresh on our mind because of recent interaction are likely to be a better "bet", as they are more likely to be physically accessible (Borgatti and Cross, 2003; Burt, 2000b; Zahn, 1991), and it "takes more energy to connect to those who are far away than those who are readily available" (McPherson et al., 2001: 429).

On the other hand, however, there is reason to believe that social recall differs in some important respects from non-social recall. Specifically, research on cognitive network activation (Smith et al., 2020; Smith et al., 2012) – a sub-branch of social recall research examining the process by which potential network contacts come to mind for specific needs or with specific attributes – has brought to light two aspects of the social recall process that may differ from what we know from broader recall research and potentially call into question the role of the recency effect in social recall.

First, research on cognitive network activation emphasizes the role of filtering criteria in the retrieval processes (Menon and Smith, 2014; Shea et al., 2015; Smith et al., 2012)[4]. The filtering process implies an inherent instrumentality or purposefulness in the recall process that may potentially reduce biases such as the recency effect common in more heuristic or subliminal retrieval processes (cf. Kahneman, 2011). Thus, when individuals make a purposeful effort to elicit network contacts with certain characteristics, as opposed to

[4] In this regard, cognitive network activation is not dissimilar to the underlying logic of name generators (Burt, 1984) in that it elicits contacts that fit certain criterion, as opposed to free semantic recall (e.g., Gruenewald and Lockhead, 1980), which is inherently indiscriminate. However, as opposed to name generators, which act as a tool to map respondents' position in a social structure, the theoretical focus of cognitive network activation is on the cognitive underpinnings of social recall (Smith et al., 2020).

recalling them indiscriminately, it cannot be assumed that the recency effect will manifest in the same way as during free, semantic recall.

Second, while in studies of non-social recall, respondents typically purposefully learn a series of items in a structured and ordered manner, which they are then asked to recall, this is not the case with extant work on cognitive network activation (Sasaki, 2009; Smith et al., 2012). Instead, "learning" takes place haphazardly over an extended period before recall, in the form of respondents' own social experience. We may have first "learned" of our acquaintances many years ago, which implies a much longer period of time between learning and recall than is the case in most studies of the recency effect (Murdock Jr, 1962; Poltrock and MacLeod, 1977)[5]. However, it may also be the case that interacting with a given person, or even being reminded of them in some way, may serve to "refresh" or "re-learn" that social information, allowing the recency effect to manifest if that information is to be recalled soon after.

Taken together, we believe it is imperative to gauge the presence and strength of the recency effect in social recall, yet using a task setup designed to more closely resemble cognitive network activation (Shea et al., 2015; Smith et al., 2012) than cognitive and experimental psychology studies of recall (e.g., Bond Jr et al., 1985; Hills and Pachur, 2012), i.e. by applying filtering criteria to the recall process and having participants draw from the repository of own connections accumulated over their lifetime as opposed to a deliberately memorized set.

In assessing the presence and extent of the recency effect in cognitive network activation we aim to create a theoretical and methodological bridge from cognitive psychology to the study of social networks, opening up the possibility of further exploration of this fundamental cognitive feature. We believe this is important because the cognitive network activation process is an important precursor to network mobilization decisions (Smith et al., 2012). Although some interactions come about serendipitously (Busch and Barkema, 2020; Kilduff and Tsai, 2003) or form under the influence of structural constraints

[5] We note that some studies have examined the recency effect over longer periods as well (e.g., da Costa Pinto & Baddeley, 1991; Sehulster, 1989), albeit rarely over the period of a lifetime. Whether the recency effect is best explained by a single or dual-store (i.e. short-term vs. long-term) model of memory is the subject of debate (Capitani et al., 1992; Davelaar et al., 2005), and is beyond the scope of this study.

(Kilduff and Brass, 2010), network scholars are increasingly concerned with the active network behaviors individuals use to search for information, obtain advice, or gain support (Anderson, 2008; Bensaou et al., 2014; Vissa, 2012). Temporal biases induced by the recency effect may become a major impediment to individuals' pursuit of such resources. Those who may most easily come to mind may not necessarily be the ones best able to provide the requisite information, advice or support. This is because the people who have recently been on one's mind are likely to be the same ones with whom one frequently interacts (Pachur et al., 2013) or is emotionally closer to (Hill and Dunbar, 2003). With respect to accessing novel, non-redundant information, diverse perspectives on a problem, or to broaden the basis of support, network contacts favored by the recency effect likely have less to offer than weak, bridging or dormant ties (Burt, 2005; Granovetter, 1973; Levin et al., 2011). In such situations, the efficient cognitive adaptation that is the recency effect may quickly turn into a myopic weakness.

METHOD

Sample

Our online sample was drawn from Amazon's Mechanical Turk (www.mturk.com), henceforth MTurk) (Buhrmester et al., 2011). MTurk is increasingly used for research purposes in the field of management, and has proven to be a reliable source of representative data (Casciaro et al., 2014; Haran, 2013; Kovács et al., 2013). All respondents were located in the United States. The initial sample consisted of 222 individuals. Eight respondents were dropped because they failed attention checks (O'Reilly et al., 2014; Oppenheimer et al., 2009), making their data unreliable. Thus, our final sample consists of 214 individuals, all of whom were paid for their participation, in accordance with Mturk practice.

Procedure

We collected data in three steps. First, we asked participants to complete a trial task to ensure that they understood the procedure and were familiar with the online task interface. This task simply involved listing any animals that came to their mind. Once they typed in an animal and hit enter, the text box would empty, and they could write in another.

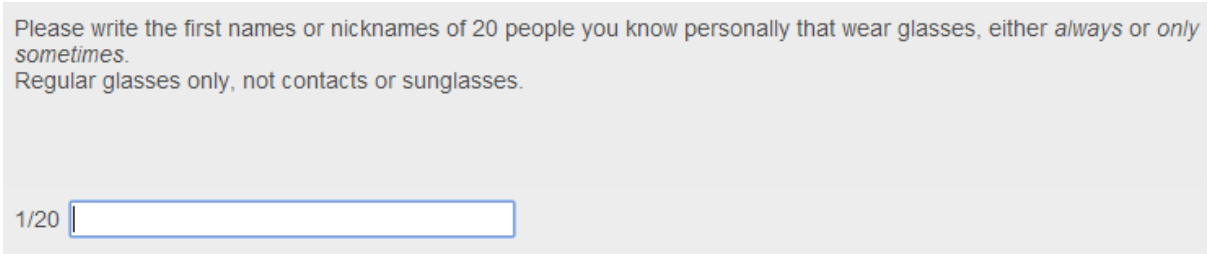
Second, respondents completed a semantic recall task: they were asked to name any 30 cities, in the order in which they came to mind (cf. Nissen et al., 1987). This task was intended to validate our empirical approach; specifically, it served to verify the presence of the recency effect in a non-social recall task, using our specific setup, which did not include a memorizing phase (Capitani et al., 1992; Murdock Jr, 1962).

Finally, for the social recall task, we asked respondents to "write the first names or nicknames of 20 people [they] know personally that wear glasses, either always or only sometimes. Regular glasses only, not contacts or sunglasses". Our social recall task is similar to the setup of prior research on social recall (e.g., Hills and Pachur, 2012; Marin, 2004) in that respondents were asked to list the names of people they personally knew, but with three important differences.

First, in contrast to some of the work on social recall (Brashears, 2013; Brashears and Quintane, 2015), we did not include a learning phase. This is because we wished to move away from learn-then-recall approach to something more in line with the logic of cognitive network activation: simply recalling, with learning having taken place diffusely at an unspecified earlier time, i.e. by way of lived experience.

Second, as opposed to the traditional pencil-and-paper method, ours was administered online using a custom-built JavaScript platform (similarly to Brewer, 1993) (see Figure 2 for a screenshot). This allowed us to measure response time with great precision, while also removing any potential biases or distractions stemming from the presence of an interviewer.

Figure 2. Illustration of online survey platform



Third, and most importantly, while social recall tasks are usually indiscriminate with respect to the characteristics of the acquaintances (e.g., Brewer, 1993; Sudman, 1985) or friends (Brewer and Webster, 2000) they elicit, ours included a filtering specification. The reason

behind this was to partially emulate the socially and managerially relevant task of cognitive network activation (Menon and Smith, 2014; Smith et al., 2012), in that respondents searched their minds for a specific kind of network contact. This situation is similar to that faced by a manager, entrepreneur or member of an organization when thinking of whom best to ask for advice on a certain matter. However, at the same time we wished to exclude any deliberation related to the degree to which a certain contact is fit for purpose (e.g. able to give truly useful advice), or to their expected willingness to help (e.g. when asking for a favor). The filtering criteria, while present, needed to be simple and unambiguous. Further, we aimed at selecting a filtering criterion that is largely, if not wholly, independent of respondents' social and demographic background – a neutral filter. For example, had we asked respondents to name any lawyers that they knew, we would have place certain respondents at an advantage. Wearing glasses fulfils all these criteria: while selective, it would not unduly hinder recall, as approximately two-thirds of the U.S. population wear glasses (Statista, 2020). Also, note that in this task, we only asked for 20 items, so as not to overburden our respondents. Difficult as it may seem at the beginning, all respondents were able to complete the task, albeit at varying speeds.

Participants performed the semantic and social recall tasks following the same protocol. They were informed that they were going to be asked to list certain items in the order that they came to their mind, i.e. in the order that they were recalled from memory. The specific kind of item – cities and people wearing glasses – was only revealed at the moment the task began. At this time, respondents were presented with a text box in which to type items. When pressing enter, a blank text box would appear to enable participants to enter the next item. As they progressed through the task, we would record the time they took to think and type each item. A counter would show to participants how many items they already entered.

Following both tasks, we asked respondents about certain attributes of the items (cities or people) they listed. With respect to the people they recalled, these questions were essentially name-interpreter questions (Burt, 1984), the aim of which was to obtain further information about the contacts they just recalled, including – critically – when that person or city had last been on their mind.

Measures

Recency (0, 1) refers to whether or not the given city or person was on respondents' mind, in any way, in the last seven days. For cities, we asked "has this city been on your mind at all in the last 7 days (before doing this survey)? Please tick the box if, in the last 7 days, you have been to this city, talked about this city, mentioned this city to someone, remember thinking about this city." In relation to people wearing glasses, we asked "Did you talk to this person? Did someone (or you) mention this person? Do you remember thinking about this person at all? Where you somehow reminded of this person (e.g. seeing a picture on Facebook)? Please tick next to the people who were somehow on your mind within the last seven days."

Relatedly, *dormancy* (0, 1) refers to whether the given person is one with whom the respondent has not talked personally for at least three years (Levin et al., 2011). Dormant ties may be particularly difficult to recollect yet potentially an important source of novel information and different perspectives (Levin et al., 2011; Walter et al., 2015).

Response time is the time elapsed between recalled names and is indicative of the difficulty of retrieving names from memory (Osth and Farrell, 2019). We measured it as the amount of time in milliseconds, rounded to seconds for convenience, that the respondent spent thinking before writing down a name. This period of time began when the respondent finished typing the previous name and ended when he/she began typing the current one.

Tie strength is an important potential correlate of recency. Although there is no one-on-one relationship between recency and tie strength, we tend to spend more time with people who are emotionally close (Granovetter, 1973). To explore the extent to which the recency effect may be driven by – and potentially conflated with – a tendency to recall stronger ties, we measured tie strength using a five-point Likert scale (adapted from Kogovšek et al., 2002) by asking respondents how close they felt to the given person.

Knowing the previous person refers to whether a given recalled person personally knows the precedingly recalled person. This last measure allows us to explore the role of recency in patterns of associative clustering (Brewer and Garrett, 2001), i.e. the tendency to recall contacts in groups of people we see as related or sharing a key attribute.

Finally, we measured *working memory.* This cognitive function (Baddeley, 2003; Daneman and Carpenter, 1980) has been associated with the recency effect (Sasaki, 2009). We assessed it using the number of correct responses (0-35) in the N-back task (Kirchner, 1958). The task is widely used to measure working memory capacity (Conway et al., 2005). Respondents are shown a string of letters on their screen in quick succession, such that each letter is only visible for a moment. When seeing a letter, respondents are asked to indicate whether or not the letter they're seeing is the same letter they saw right before (1-back), two letters before (2-back), or three letters before (3-back). We used the intermediate, 2-back measure.

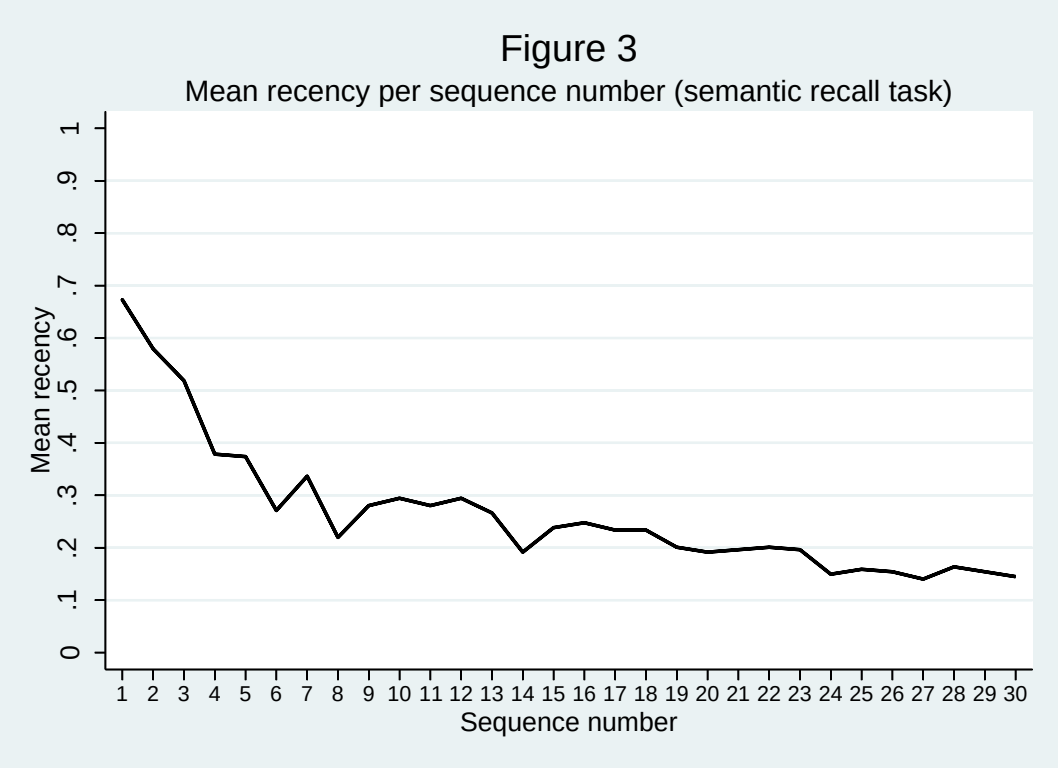
Analyses

To analyze the extent of recency bias in the semantic and social recall tasks, we treated the dyad as our unit of analysis: the ego-item dyad in the case of the semantic recall task, and the ego-alter dyad in the social recall task. Compared to individual-level analyses, this approach increases the number of data points allowing for greater degrees of freedom. Further, it allows us to add individual-level fixed effects, which means our analyses are less prone to omitted variable bias. We therefore had 30 sequential observations per respondent in the semantic recall task (n=6420), and 20 per respondent in the social recall task (n = 4280). For a handful of analyses, we relied on individual-level aggregated data (means), with a sample of 214 respondents.

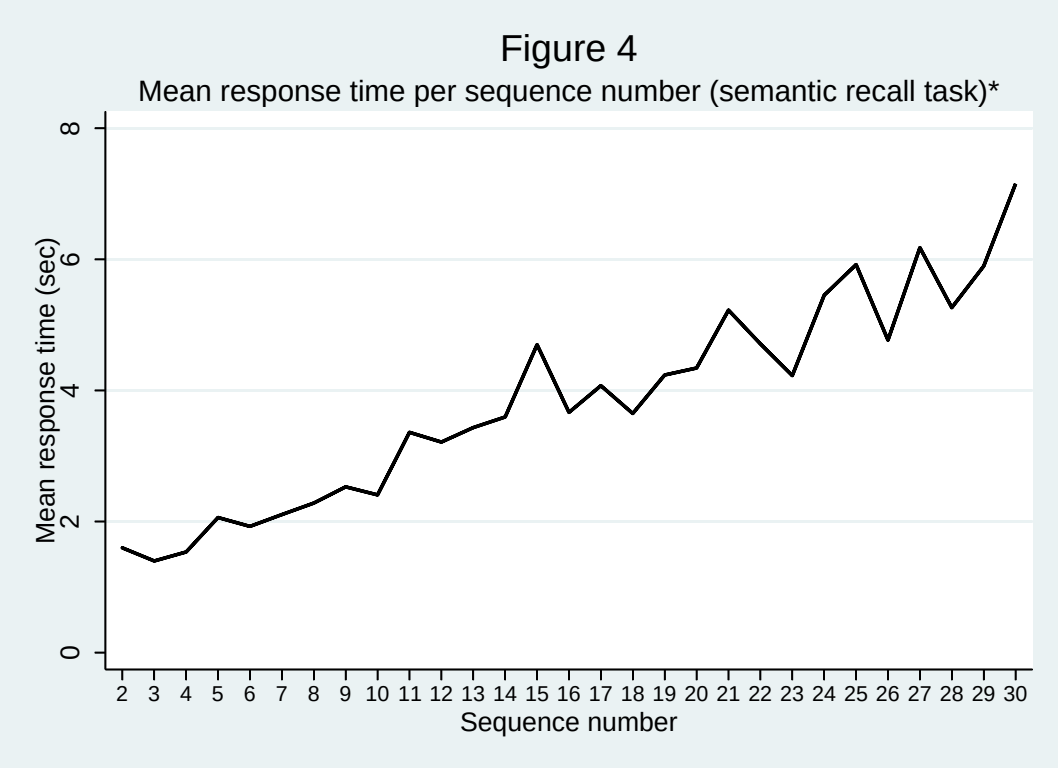
RESULTS

Semantic recall task

We begin with a visual illustration of the recency effect in the semantic recall task. Figure 3 plots the mean recency per sequence number (first to thirtieth city) for all respondents. Cities that have recently been on respondents' mind were mentioned earlier in the list; 67% of cities mentioned first were recently on their mind, as compared to 14% for the thirtieth city. The visual illustration of the effect is corroborated by a Pearson's correlation of -0.24 ($p < 0.001$) between sequence number and recency.



Concurrently, response times grew lengthier as respondents progressed through the task (see Figure 4). Thus, as respondents ran out of recent, and thus cognitively more accessible, cities, response times increased. The mean response times for recent cities was 2.86 seconds, as compared to 4.13 seconds for nonrecent cities (diff. sig. $p < 0.001$). Accordingly, the correlation between recency and response time was significant and negative ($r = -0.10$, $p < 0.001$), and that between sequence number and response time was positive ($r = 0.25$, $p < 0.001$).



*The first sequence number is omitted, as this response time includes the time required to read a short instructional text.

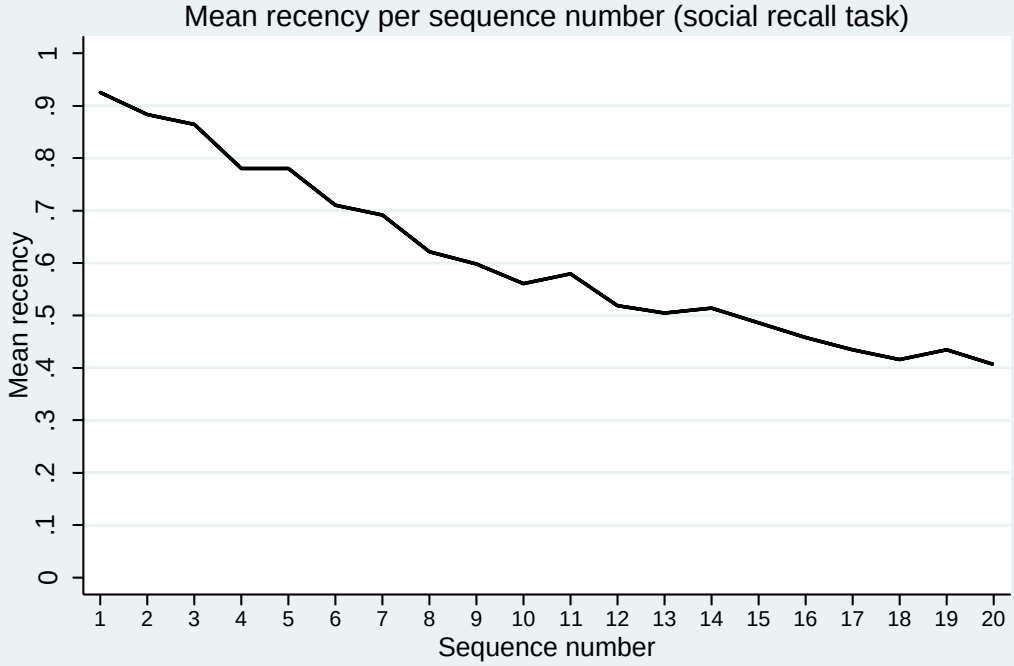
These results validate our custom-designed online task for use in the subsequent social recall task. The clear manifestation of the recency effect, along with the gradually increasing response times provide assurance that respondents completed the task as instructed, as findings fall in line with prior research on the recency effect for non-social tasks (Davelaar et al., 2005; Murdock Jr, 1962). Further, these data may serve as a benchmark for the social recall task.

Aggregating data to the level of the individual, we examined the relationship between working memory capacity and the strength of the recency effect (i.e. mean recency at the level of the individual). We found a significant, positive relationship between the two ($r = 0.21$, $p < 0.01$), meaning that respondents with stronger working memory mentioned on average more recent items. This finding corroborates the results of Sasaki (2009).

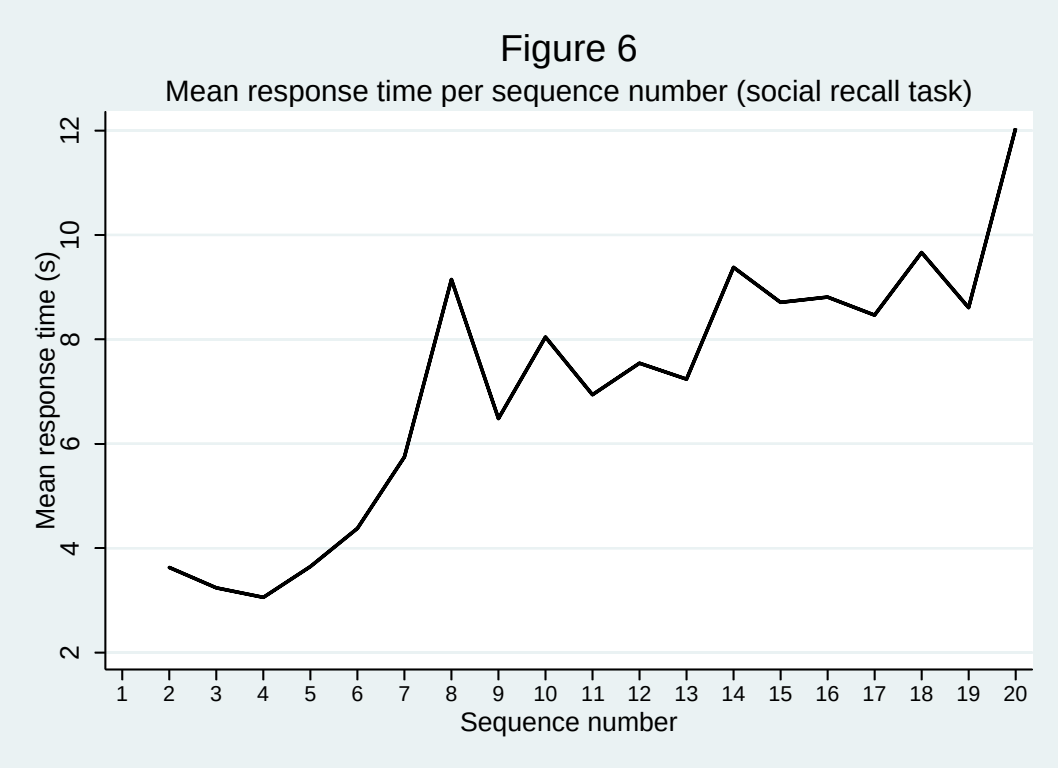
Social recall task

We now turn our attention to the social recall task that is the essence of this study. Again, we begin with a visual illustration (see Figure 5).

Figure 5

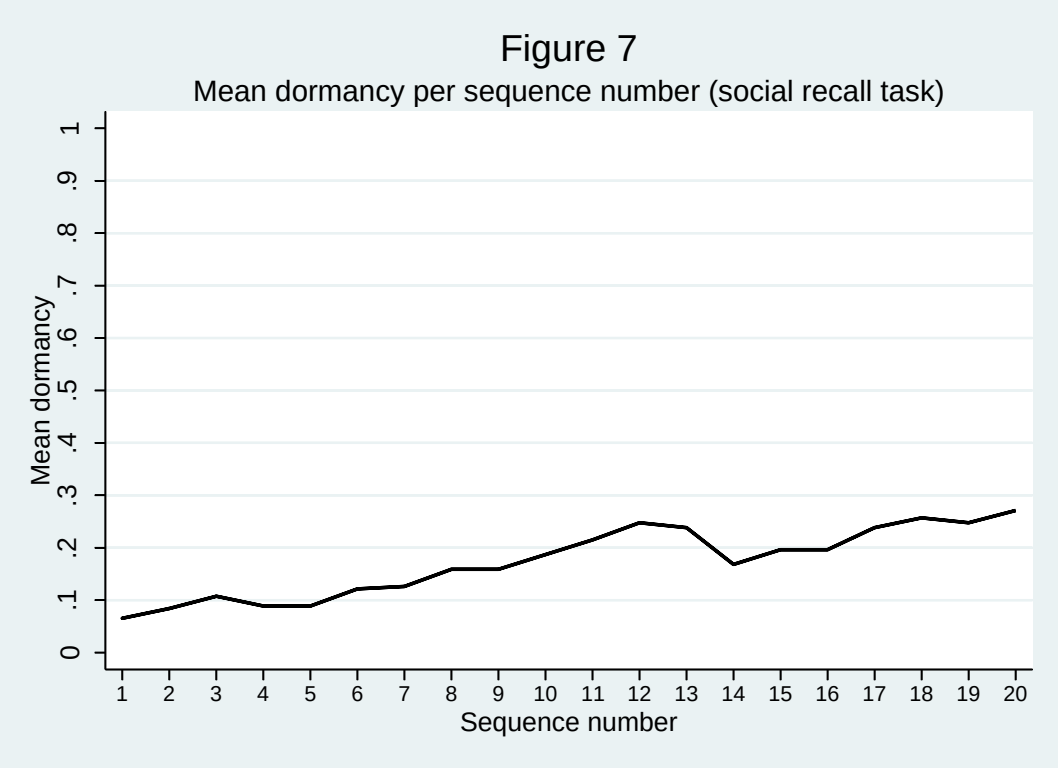


The recency effect is immediately apparent. The first name that respondents listed has recently been on their mind in 93% of all cases. By halfway through the task (i.e. the tenth name), this rate drops to 56%, and at the end (i.e. the twentieth name), the rate is only 41%. The correlation between recency and sequence number is negative and significant ($r = -0.32$, $p < 0.001$). At the same time, as recency drops, response time increases (see Figure 6). On average, this is reflected in a response time of 6.1 seconds for recent ties, as compared to 8.7 seconds for nonrecent ones (diff. sig. $p < 0.01$). We find a negative correlation between recency and response time ($r = -0.09$, $p < 0.001$), and a positive one between sequence number and response time ($r = 0.13$, $p < 0.001$). This implies that individuals take gradually longer to recall later names of people that were on their mind longer ago.



*The first sequence number is omitted, as this response time includes the time required to read a short instructional text.

Turning to dormancy, we find that dormant ties were rarely recalled, and when so, mostly at later stages of the recall task (see Figure 7 below). This was to be expected, as – although recency and dormancy are not mutually exclusive in our study (a dormant tie may have been seen on Facebook recently, for example) – the two are nonetheless largely oppositional ($r = -0.24$, $p < 0.001$). The stark differences in recall speed between the two tie types are illustrated by the fact that, while recent (and non-dormant ties) were recalled, on average, in 5.9 seconds, the same amount is 10.5 seconds for dormant (and non-recent) ties. The correlation between dormancy and sequence number was 0.16 ($p < 0.001$), and that between dormancy and response time was 0.08 ($p < 0.001$). This implies dormant ties may be the greatest victim of individual tendencies to recall more recent ties more easily and more quickly.



At the level of the individual, we again find that the observed strength of the recency effect is linked to working memory capacity ($r = 0.18$, $p < 0.01$). This link is stronger in the early stages of recall, with a stronger correlation in the first half (sequence numbers 1-10) than in the second (sequence numbers 11-20) ($r = 0.21$, $p < 0.01$ and $r = 0.13$, $p < 0.10$, respectively).

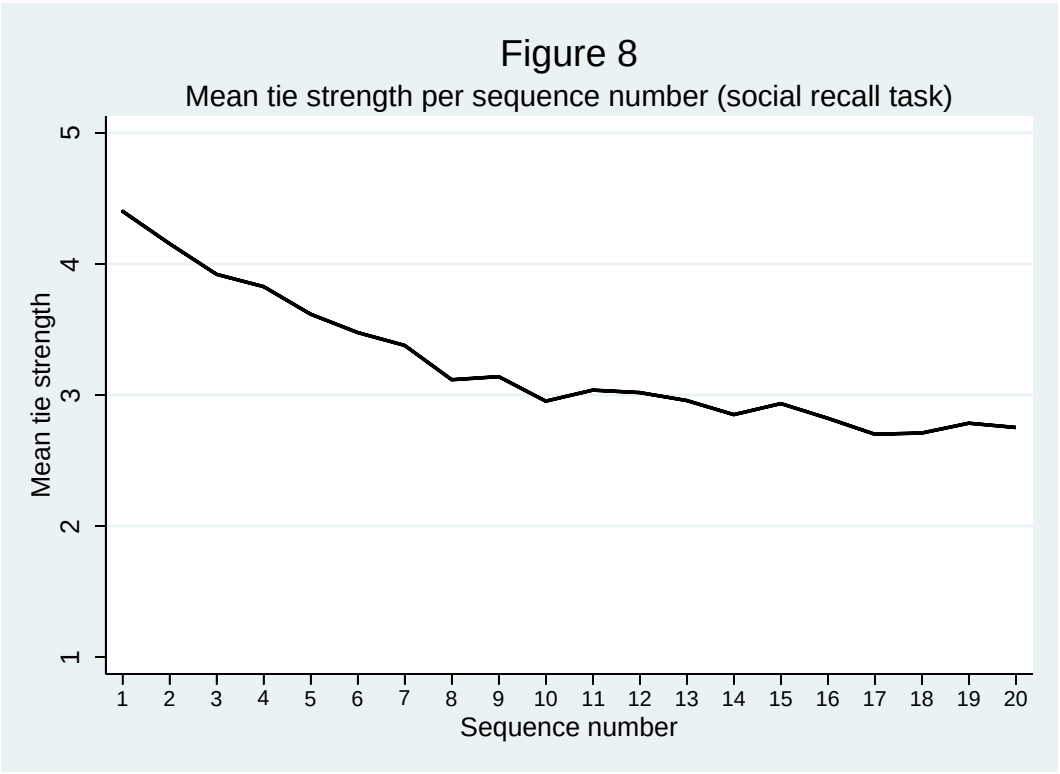
Assessing the social recall process in more detail

As the above analyses have shown, respondents tend to recall those whom they have met or thought about recently more easily and quickly. In order to provide a more complete picture we now offer additional analyses that position the recency effect amongst other factors that may affect social recall.

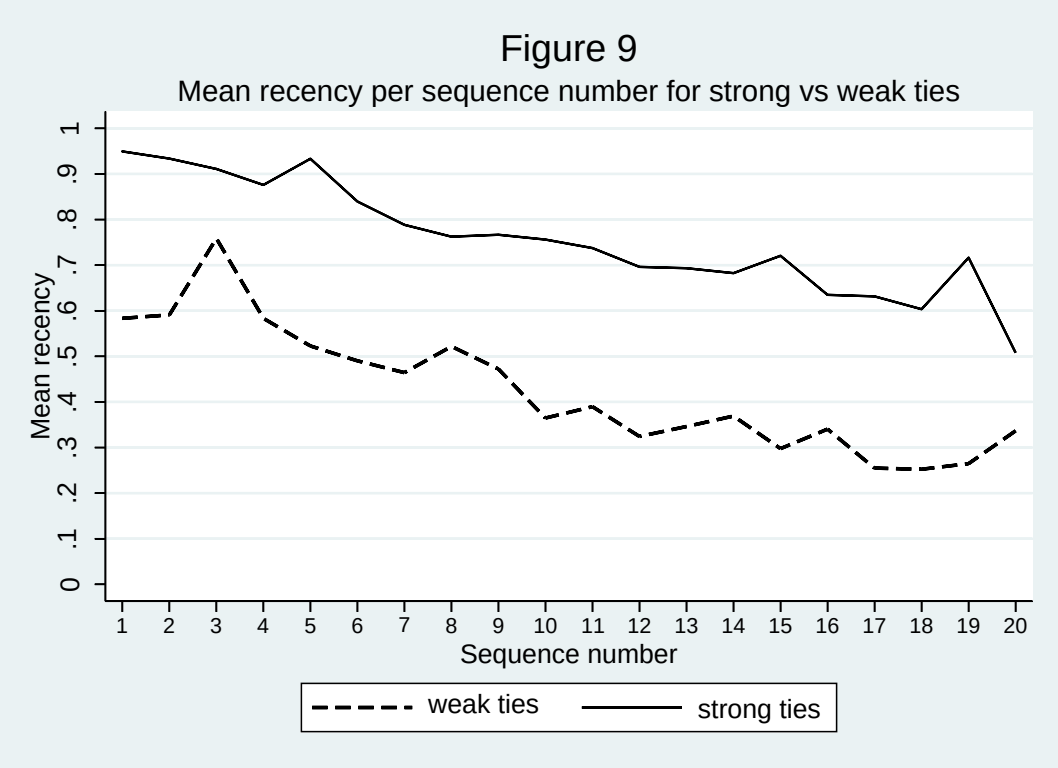
Tie strength is one such factor. It may be that individuals do not simply recall recent contacts more easily but favor those who are closer to them. To explore this possibility, we plotted tie mean tie strength by sequence number (see Figure 8). We observe a gradual movement from strong to weak ties as people recall additional names. On a five-point scale mean tie strength of the first person recalled was 4.4, while that of the last was only 2.8. Further, it took respondents an average of 4.7 seconds to recall a very strong tie (tie strength = 5), as compared to 9.3 seconds for the weakest (tie strength = 1) tie. Accordingly, we find

the correlation between tie strength and sequence number is negative ($r = 0.34$, $p < 0.001$) and between tie strength and response time is positive ($r = -0.11$, $p < 0.001$).

Figure 8



Tie strength is strongly related to recency ($r = 0.40$, $p < 0.001$); we tend to meet strong ties more frequently, and those we meet frequently have a better chance of becoming strong ties. However, it is important that we distinguish the effect of tie strength from the recency effect. First, we note that a small but noteworthy proportion of the strongest ties (tie strength = 5) were considered non-recent (11.9%) or even dormant (8.3%). Even within these strongest ties, we find that respondents took significantly more tie to recall dormant (and non-recent) ties than non-dormant, recent ones (mean response time = 8.45 seconds and 4.34 seconds respectively, diff. sig. $p < 0.001$). Second, if we separate strong (tie strength ≥ 4) and weak ties (tie strength ≤ 2), we find that the recency effect holds in both cases (see Figure 9).



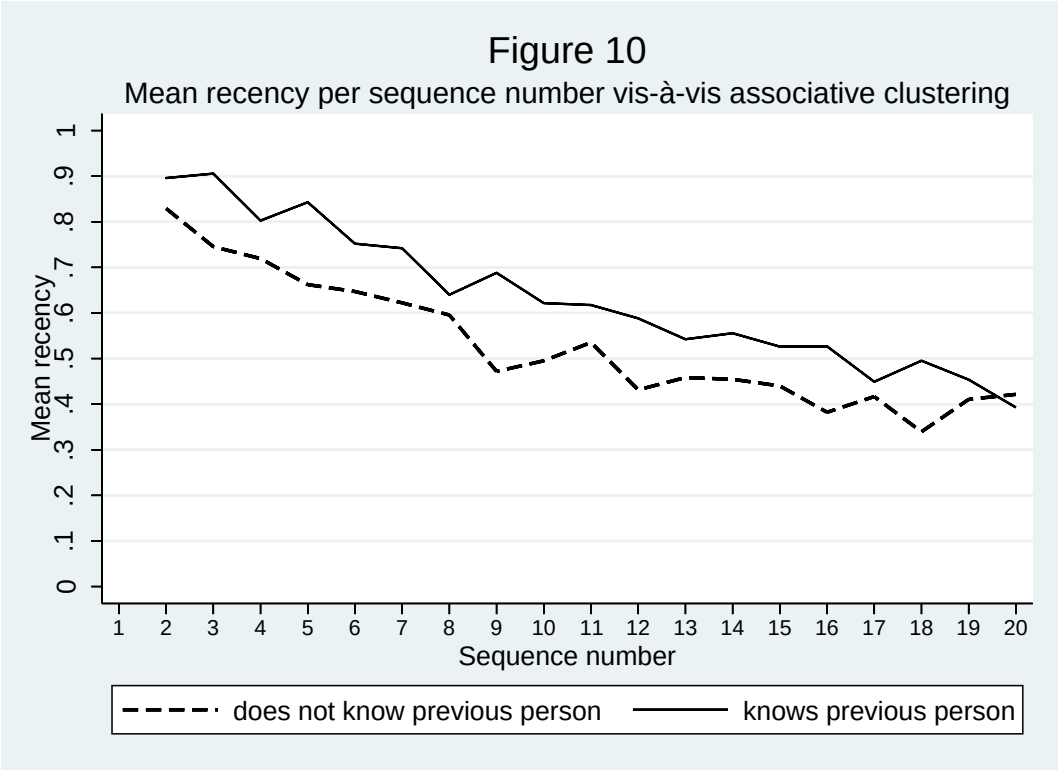
While the above factors (recency, dormancy, and tie strength) all played a role in determining when a certain tie would be recalled (or, to put it differently, what kinds of ties were recalled early versus late), the process is not a purely probabilistic one. Instead, in line with the concept of associative clustering (Hills and Pachur, 2012; Jenkins and Russell, 1952), we find that participants tended to recall network contacts in chains. That is, each recalled person would act as a reference point for local search, and respondents would seek to recall others who are, in their minds, associated with the precedingly recalled person. As people are known to organize their knowledge of personal contacts along the lines of a perceived network among them (Brewer, 1995; Mehra et al., 2014; Simpson et al., 2011), these perceived ties among alters act as the main avenues for association, and therefore sequential recall.

In line with the associative clustering process, we find that subsequently recalled network contacts were often related: i.e. the respondent indicated that they knew each other. The mean number of connected chains (associative clusters) was 2.7, with a range of 1 to 8. The mean length of a chain was 3.7 recalled persons (st. dev. = 2.2), while that of the period between chains was, on average, 2.2 persons (st. dev = 2.0). We also find that the associative clustering process speeds up the recall process. On average 4.7 seconds elapsed

between names in a chain, whereas an average of 8.0 seconds passed between names that were not part of a chain.

We ran a similar set of analyses with associative clustering as we did with tie strength, in order to disentangle its effects from that of recency. We begin by noting that associative clustering (i.e. knowing the previous person) is positively correlated with both recency and tie strength ($r = 0.15$ and 0.19 respectively, $p<0.001$), and negatively with response time ($r = -0.20$, $p<0.001$). We then plotted recency against sequence number for recalled contacts that knew/didn't know the previously recalled person (see Figure 10) and found that the recency effect holds both within and between clusters.

Figure 10



DISCUSSION

Our results provide evidence of the recency effect in cognitive network activation: respondents named people they had seen or thought about more recently earlier and more quickly, whilst relations that had gone dormant were rarely recalled. These findings corroborate the importance of the recency effect in wider research on memory and expand its application from semantic to social recall tasks. As our task differed from the traditional social recall task (e.g., Bond Jr et al., 1985; Brewer, 1993) and was designed to more closely resemble the process of cognitive network activation (Shea et al., 2019; Smith et al., 2012),

our study demonstrates that the recency effect is manifest also when items are recalled from individuals' naturally accumulated learned experience (as opposed to deliberately memorized lists) and if the recall process applies filtering criteria (as opposed to involving indiscriminate retrieval from memory). Taken together, we have shown that a theoretical bridge exists between the memory retrieval research done in experimental psychology and the cognitive network activation work done in the field of social networks. More specifically, our findings have several theoretical implications for social network research and practical implications for network maintenance that open up new avenues for future research.

First, the recency effect will have implications for how individuals mobilize their existing network connections for advice, support, or access to resources. For example, future research may investigate the degree to which the recency effect distorts organizational advice networks, away from rational or affect-based decisions and towards those driven by potential inertia resulting from the recency effect. The literature on intra-organizational advice networks tends to treat alter choice as a largely rational process. Advice ties are argued to be selected from a complete consideration set of all potential colleagues in the organization (Borgatti and Cross, 2003; Nebus, 2006) and the selection is based on considerations related to, for instance, perceived competence, accessibility (Borgatti and Cross, 2003) and affect (Casciaro and Lobo, 2008). Our results suggest that such an approach may not be an accurate portrayal of the process underpinning advice seeking. Individuals may not, in fact, consider the full potential network at their disposal, but only a restricted subset of salient ties, which may in turn lead to suboptimal advice choices.

It can be expected that, the structural properties of individuals' networks being equal, those better able to locate the right people within their network at the right time will be at an advantage (Smith et al., 2020). "Rather than investing in building new ties, the critical question may instead be about how to activate the appropriate subsections of one's existing, potential network" (Menon and Smith, 2014: 128). The ability to do so may substantially aid those looking for a job (Granovetter, 1974), for advice (Borgatti and Cross, 2003; Walter et al., 2015), or for help in starting a new venture (Greve and Salaff, 2003). In contrast, those who let their network mobilization decisions be guided by the recency effect may compromise the amount, quality or variety of advice accessed. Given the generally small size of advice networks (e.g., Casciaro, 1998; McDonald and Westphal, 2003), the recency effect may even

be amplified in real-world situations due to a self-reinforcing cycle: advice relations that follow from the recency effect make the chosen alters again more salient. Combined with the tendency to engage in repeated interactions (Granovetter, 1985) and to the extent that advice from recent ties is indeed suboptimal, the result may well be the ossification of subpar advice networks. Individuals seeking to mitigate such risks would do well in ensuring they regularly expose themselves to a broad variety of social contexts where the memory of non-recent, yet relevant contacts can be "updated". A strong presence on social media, active participation in professional events, and participation in alumni activities provide natural means through which one can do this.

Second, the recency effect may – for better or worse – be a major driver of network evolution, selecting *for* recently activated ties and *against* those not recently activated (cf., Pachur et al., 2013). The recency of past contact can be expected to predict future contact by way of a power relationship, such that we are much more likely to reconnect with those we have interacted with recently than with those we have not (Anderson and Schooler, 1991; Pachur et al., 2013, 2014). In particular, dormant ties, i.e. connections to people with whom one has not interacted in a long time (Levin et al., 2011), will gradually fade away when left at their own devices, until they are gone forever (Burt, 2000a).

Future research may delve deeper into the implications of the recency effect for network evolution. On the one hand, the tie decay implications of the recency effect may help reduce tie maintenance costs by keeping network size at a manageable level (Hill and Dunbar, 2003). It may also aid integration into a new organization (cf. Korte and Lin, 2013; Morrison, 2002) or a new country (cf. de Miguel Luken and Tranmer, 2010; Strang and Ager, 2010) by focusing attention on present, as opposed to distant, ties. On the other hand, however, this same mechanism may deprive us of valuable ties that are non-recent (Burt, 2002; Levin et al., 2011), and lead to networks that are dense and circulate redundant information (Burt, 2005). Valuable connections may decay and eventually fade into oblivion not because we chose to let them go, but because we were simply not reminded of these people for a long enough time that they have eluded our attention. Bridging ties – one of the key elements of social capital – are especially vulnerable, as they the lack of embeddedness necessary to frequently remind us of their existence (Burt, 2002). Likewise, dormant ties have been shown to provide a very valuable combination of novel information and ease of communication (Levin et al.,

2011; Walter et al., 2015). As Granovetter (1974: 82) wrote, it is ”a remarkable fact that one may receive crucial information from individuals whose existence one has nearly forgotten”. While slipping into dormancy may not necessarily result in an irreversible loss of social capital (Levin and Walter, 2018), the recency effect may force valuable weak ties into premature dormancy. Given the fact that such peripheral ties are more likely to be forgotten (Roth et al., 2021), most of them will probably not be recalled from dormancy. Instead, they will slowly fade away, along with any potential social capital benefits they may have provided.

Awareness and acknowledgement of the recency effect during social recall and network search tasks may, in itself, help individuals mitigate its negative consequences when necessary. We may have forgotten someone relevant, simply because we could not see them through the haze of temporal distance. Yet, as recent research on networking seems to imply (cf. Bensaou et al., 2014; Casciaro et al., 2014; Vissa, 2012), keeping a sufficiently broad variety of contacts at the forefront of one’s mind may require an active effort in tie maintenance activities. Skimming through or Facebook or LinkedIn friends, or perhaps our phone contacts, may remind us of important contacts at risk of slipping from our mind, whilst investing time and energy visiting places where one lived or worked in the past can be key to preventing potentially valuable contacts from decay. As a flipside of the same argument, effective networking may involve ensuring to say salient in the minds’ of others, for instance through regular posts on social media, or by being an active citizen in an organization’s social life. Likewise, entrepreneurs seeking funding and visibility may benefit from reminding crucial contacts of their existence at regular intervals, for instance through symbolic actions that signal their competence and credibility (Zott and Huy, 2007).

Third, the recency effect, and its consequences for network mobilization and evolution, may be contingent on a variety of factors worth further exploration. For example, the extent to which the recency effect manifests may depend on the nature of task at hand or the resource required. When thinking of whom to invite to a social event, or whom to ask for general advice, then recent contacts are likely to be at the forefront of our minds. If, however, it is conceivable that the recency effect is weaker for more specific needs or tasks. It may thus be worthwhile to compare network activation across tasks of differing complexity and nature, to better understand how recency weighs into them.

Further contingencies may arise at the level of the individual. In terms of personality and cognition, it may well be that certain individuals are more apt than others at suspending the recency effect when it becomes detrimental, such as when remembering dormant and distant ties provide an advantage. High self-monitors (Snyder, 1974), for example, tend to organize their social ties along activities and resources, as opposed to strictly emotional lines (Snyder et al., 1983), and this tendency may allow them to search their networks differently than others. Also, when it comes to remembering dormant ties, we may find that time perspective (Zimbardo and Boyd, 2015) plays a role, such that those with a past-positive orientation are less forgetful of their non-recent contacts. Other relevant differences may be behavioral; those who put more effort into maintaining ties (cf. Vissa, 2012) may think of them more often, thus mitigating the effects of lost recency.

CONCLUSION

In this paper, we departed from the observation that, an increased attention to cognitive factors in social network research notwithstanding, the robust and thoroughly documented recency effect in memory research was all but overlooked in research on social recall and cognitive network activation. We designed and implemented a task that served as an empirical and theoretical bridge from experimental psychology and the study of memory to the interests of social network scholarship and found robust evidence of the recency effect in cognitive network activation. As we have only scratched the surface of the myriad ways in which the recency effect may shape social interaction, we hope to inspire future network scholars to further explore this phenomenon.

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