

Dangling social relationships: An explorative work in a new phenomenon on social networking sites to modernise and expand the egocentric social network model following the Social Brain Hypothesis

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Abstract

This study investigates "dangling social relationships," a newly identified phenomenon that emerged from the daily use of social networking sites for relationship maintenance practices. These relationships exist between active social connections and parasocial relationships, characterized by the cessation of direct interaction between former friends and acquaintances, whilst passive observation of each other's online activities continues. According to the Social Brain Hypothesis, if these relationships demand time and cognitive resources, they could alter the structure of egocentric social networks, which are constrained by time and cognitive limits. It is therefore of merit to study dangling social relationships and their potential impact. An exploratory mixed-method approach was used to investigate these relationships. First, an online questionnaire with 38 participants recruited through social media established the existence and nature of dangling social relationships. This was followed by task-based interviews to explore the emotional and cognitive dimensions of these relationships. Finally, a field experiment using an interactive installation examined the variety of one-sided emotional bonding users can have towards these relationships. The findings confirm that individuals continue to invest time and cognitive resources in dangling social relationships despite the cessation of interaction and for some the emotional bonding. These results suggest the need to integrate dangling social relationships into existing social network models, offering a modern and comprehensive understanding of how various relationships are maintained and developed, both offline and online. This study contributes to the ongoing discussion on how social networking sites influence the structure of egocentric social networks.

Keywords: egocentric social network, self-disclosure content, emotional bonding, social time, cognitive capacity, social media use, dangling social relationships, Social Brain Hypothesis

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Introduction

Social networking sites (SNSs) like Instagram, LinkedIn, TikTok, Facebook, and X have integrated into our practices of forming and maintaining relationships we have with others over the past two decades. The increased use of SNSs has led to active debates in academic research about whether the functionality of SNSs influences the structure of our egocentric social network (ego network). The term ego network has come to be used to refer to all relationships an individual – called ego – has with other people – called alter (Arnaboldi et al., 2013). These debates are focused on social relationships. Social relationships are relations you have with family, friends, and acquaintances. The definition broadly characterizes the bonds between people who have recurring interactions that they perceive as meaningful on a personal level (August & Rook, 2013). According to Dunbar however, the use of SNSs does not affect the ego network, it merely supplements social relationships (Ellison et al., 2007; A. G. Sutcliffe et al., 2018). However, SNSs also facilitate relationships where interaction has ceased or has never been present, like parasocial relationships.

In 1956, psychologists Horton and Wohl popularized the term parasocial relationship to describe a bond between a person and someone they do not know personally but do feel involved or related to; for example, the world-famous singer-songwriter Taylor Swift. In contrast to social relationships, parasocial relationships are thus asymmetric: the ego knows and feels up to a great deal about the alter, while the alter often is not even aware of the other's existence. Given the various relationships possible to maintain and develop on SNS, there is a need for research focused on how the use of SNSs platforms facilitates different relationships and which influence this might have on the current egocentric social network model. A new relationship named dangling social relationships will also be introduced which resulted from SNS use and whose potential impact on the ego network has never been studied before.

A highly influential theory about how humans maintain relationships is the Social Brain Hypothesis (SBH). According to this hypothesis, the challenges posed by social environments have been a key driver of the evolution of intelligence in primates (Byrne & Whiten, 1988; Dunbar, 1992). It has been argued that one of the implications of the SBH is that ego network sizes in primates, including humans, are constrained by our cognitive ability to deal with social complexity as well as by the time we have available for socialising (Gamble & Gowlett, 2014). For humans, this is generally held to imply an average limit of 150 social relationships in our ego network (Dunbar, 2020). This means that each one of us composes our ego network of individuals in whom we invest time and mental capacity. People outside the limit of 150, according to S. G. Roberts et al. (2009), are the global network, which includes those, among others, whom the ego would at best recognize, know the name of, and feel it appropriate to greet (de Sola Pool & Kochen, 1978).

The ego network (Figure 1) is hierarchically classified into 4 layers: intimate network, e.g. close friends (~5); sympathy network, e.g. best friends (~12-15); affinity network, e.g. good friends (~50); active network, e.g. friends (~150) (Hill & Dunbar, 2003). This classification is measured by the frequency of interaction and emotional bonding for investment in time and cognitive capacity. Although the frequency of interaction could already measure investment in both, Hill and Dunbar (2003) implies frequency of contact often overestimates the strength of a relationship between for example neighbours and colleagues. In other words, the frequency of interaction measures the possibility of emotional bonding and can therefore not function as a classification measure for the ego network without emotional bonding as a measure. Indeed, several online datasets identified the three inner layers with these measures considering SNS use (Dunbar et al., 2015; S. B. Roberts & Dunbar, 2015; S. G. Roberts et al., 2009; A. Sutcliffe et al., 2012). However, the active network is hard to determine with these measures as no easy cut-of-line can be drawn. Therefore, it is generally accepted in aforementioned studies to drop all individuals from the active network once the interaction is held off for one year.

However, current research in parasocial relationships confirms interaction is not necessary

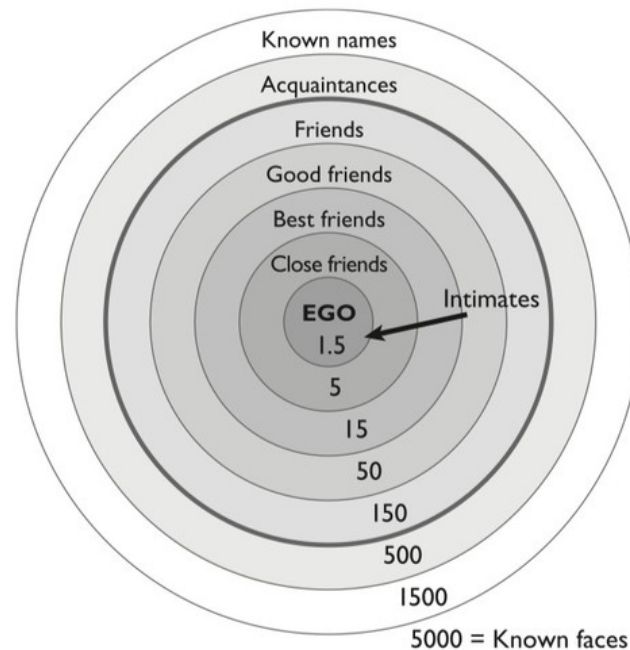


Figure 1

The circles of the egocentric social network

to maintain a relationship. The behaviour of passively consuming the self-disclosure content of the other can also maintain a relationship. The term self-disclosure content is used here to refer to personal and intimate information about oneself in text, images, or videos — for example, a post on LinkedIn or a story on Instagram. In the field of psychology, it is generally accepted that self-disclosure behaviour plays a key role in maintaining social relationships individuals have with each other (Cozby, 1973; Greene et al., 2006). Passive consumption of self-disclosure content costs social time and mental capacity and therefore makes all relationships maintained this way part of the ego network. Furthermore, it has been extensively studied that users can feel emotionally bonded in parasocial relationships because of consuming self-disclosure content of personally unknown others (See review of (Dibble et al., 2016; Hoffner & Bond, 2022)). Some research even found that parasocial relationships can give support and attachment (David, 2019). For example, support is received as someone thinks of “what would X do in this situation”.

Besides the possibility of emotional bonding as a result of consuming self-disclosure

content, SNS facilitate two other features of relationship maintenance. On SNSs users typically add individuals they have met in real life as connections (Lampe et al., 2006). Previous research confirmed users mirror their online network to their offline network (Dunbar et al., 2015). However, the offline network of users is fluid, as they meet new people, shift jobs, go to new places, or change in interests. Such events change with whom users decide to interact offline but not necessarily online. Therefore, one unique feature of SNSs is that they allow users to consume self-disclosure content from connections with whom interaction has ceased. Consuming the content of ceased connections is neither a social nor parasocial relationship. On the one hand, not social because there is no interaction and therefore both individuals do not commonly know what they know about each other. On the other hand, not parasocial because both individuals know each other personally and can contact each other. We call these relationships in which all interaction has ceased except the consumption of posts on SNS dangling social relationships (DSRs) and call the alters in these DSRs danglers. With the increasing use of SNSs, DSRs are relevant for our ego network. Especially, because another feature of SNS is that it does not automatically delete any connection when interaction has ceased. Users need to make a conscious decision and undertake action in case they do not want to receive self-disclosure content or be an online connection with the other anymore. Krämer et al. (2015) found that although users deem many of their connections dispensable, they refrain from deleting them. Consequently, users remain investing in relationships they do not feel emotionally bonded to. Moreover, the total number of connections of users increases over time, social relationships as well as dangling social relationships and parasocial relationships. Such an increase in the number of connections has the potential to impact social time and brain capacity, as well as emotional bonding.

Both parasocial and dangling social relationships thus potentially impact the ego network composition through the investment in social time and brain capacity. Both already influence the ego network because of this investment, even though the ego might not feel emotionally bonded towards them. If the ego does feel emotionally bonded, both relationships may even be part of the inner layers of the ego network.

Current study

Considering these changes, it is relevant to study the impact of modern SNS use on SBH. This study aims to explore a modern comprehensive egocentric social network model that includes all relationships in which time and cognitive capacity are invested. Previous research on the influence of SNS on ego networks excluded all relationships in which there has not been interaction or interaction was longer than a year ago. However, current research in parasocial relationships confirms interaction is not necessary to maintain a relationship, the behaviour of passively consuming the self-disclosure content of the other can also maintain a relationship. Therefore, as mentioned before, besides social relationships both parasocial relationships and DSRs may be part of our ego network from an SBH perspective. For the scope of this master thesis project, only DSRs are examined. These are chosen as these relationships are positioned in between social and parasocial and because this phenomenon has never been studied before. The study is an exploratory work and the first attempt to capture the phenomenon of DSR and its properties. We expect to find dangles with a variety of one-sided emotional bonding. Consequently, the study will make a first attempt to discover how DSR can be part of the inner layers of the ego network by measuring their emotional bonding.

Method

The current exploratory study was conducted in three sections: the questionnaire, task-based interviews, and a field experiment. The sections are arranged in chronological order of the study. We will describe how we successfully established the existence and characteristics of DSR using an online questionnaire. Afterwards, we describe an explanation of the procedure of the task-based interviews to discover the emotional bonding and cognitive capacity with specific dangles. Lastly, we describe the field experiment we especially developed in the form of an interactive installation. This installation was made to find variety in emotional bonding with dangles.

The Ethics Committee of the corresponding author's department at the university approved the study including all three components to proceed.

Questionnaire

Participants' characteristics & procedure

Participants were recruited through network sampling on social media platforms like LinkedIn and Instagram. Others shared the recruitment post and therefore a snowball effect was enhanced. The final sample consisted of 44, with three persons indicating to have no Instagram so this data was excluded from the analysis. The data collection took place online using Qualtrics between June 3rd and June 15th, 2024. After giving consent and indicating to use Instagram at least once a week they were asked to watch an informative animated video explaining the phenomenon (See Figure 2 for impression and YouTube link). Afterwards, the participants were asked to fill in answers about questions on dangling social relationships and their Instagram use. The self-designed measures existence, properties, social time and emotional bonding were used and will be explained below. After finishing the questionnaire, the participants were asked to submit a valid email address in case they wanted to participate in the follow-up in-depth interview. This was necessary so all interviewees were familiar with the phenomenon.



Figure 2

Screenshot of animated explanation video, for further reference see <https://vimeo.com/953426462>.

Measures

Existence. In order to find the relative number of DSR in relation to social relationships we used two open questions. These questions were asked after the animated video was watched and participants indicated if they recognized themselves in the phenomenon. In case they answered no, they were asked to describe why not and were then redirected to the next section. In case they answered yes, they used a 0 – 100+ slider scale to give an estimation of their total number of DSRs. We asked participants to indicate the number of estimated followers and followees, and how many of these they estimated to be in a social relationships with. An estimation was asked with a multi-choice question with a range of 0-600+ in steps of 50 to prevent users from switching to Instagram and never coming back (Orben & Dunbar, 2017).

Properties. We asked the duration of participants' oldest DSR and intentions for future interactions to discover the properties of DSR. We used a closed multiple-choice question ranging from less than a year to 10 + years to get the duration of participants' oldest DSR. For future interaction, participants were asked to indicate if they were likely to interact online and start a conversation offline. As follow-up questions it was asked "What percentage of your total group of dangles do you think you might contact again in the future?" and a multiple-choice question for what possible reason. We used a 5-point Likert scale (1=Definitely not, 5=Definitely yes) for participants to indicate if they would let the system dispose dangles with whom they have no interaction anymore and/or if they would do it their selves. An open question was given for clarification of the above two questions.

Social time. We used one open and two closed questions to find the relative time investment of DSR in relation to total online social time and offline social time. An open question was used to indicate time investment of DSR. Participants were required to give an estimation of minutes spent on maintaining DSR on SNS on an average weekday or weekend day. This distinction was made as SNS use tends to heavily differentiate during the weekdays and weekends (A. G. Sutcliffe et al., 2018). For the total online and offline social time we used an adapted version of the measure of A. G. Sutcliffe et al. (2018) to examine the total social time of the participants. We transformed all answers to multiple choice answers, as the answers tend to be more accurate than open questions regarding time investment (Ernala et al., 2020). These answers were based on Lee and Hancock, 2024 measures, to prevent users from their tendency to overestimate their online social time. Participants were asked to give an estimation of minutes spent on digital social activities and non-digital social activities on an average weekday and an average weekend day. We shortened the measure by asking straight for the two types of social time, instead of various categories. In addition, we asked participants if they use other SNS and if so, if they could other them on frequency of use.

Emotional bonding. To explore emotional bonding with dangles, exploratory questions were asked using a 5-point Likert Scale (1= Definitely not, 5= Definitely yes). These questions

considered questions regarding all dangles of the participants (e.g. “Do you think viewing the content of your dangles on Instagram influences your emotional closeness with them?”, “Do you think viewing content of your dangles on Instagram increased your emotional closeness with them?” and “Do you think viewing content of your dangles on Instagram increased your emotional closeness more than if you would not have followed them?”).

Statistical analysis

Quantitative data from both the questionnaire and interview were analysed using SPSS. Quantitative data analysis produced descriptive statistics. One person indicated to have more DSR than followees on Instagram. We excluded the participant’s data only on the results regarding the number of DSR, as the rest of their data did not show any misinterpretations.

Task-based interview

Participants’ characteristics & procedure

Participants were recruited through the questionnaire. At the end of the questionnaire, they were linked to an additional page, where they could add their email addresses if they were interested in participating in the task-based interviews. A total of 3 people participated, who were in the age group of 25-34, female, Dutch, and holding a master’s degree. Each participant used Instagram at least once a week. They however varied in number of followees; 275, 666, and 1690. The interviews took place between June 18th and June 21st, 2024, either online or in a public space, and took about an hour. Beforehand the participants were emailed a ZIP file containing an Excel template, an information sheet, a consent form, and a debriefing sheet. The participants were always invited to think out loud while performing the tasks, ask questions, and were reminded they could stop participating at any moment. At the start of the interview, the participants were asked to read the information sheet and indicate digital consent in the content sheet. We asked participants to download their following list on Instagram (Instagram provides this feature) on their laptop before the interview started and together, we uploaded this list in the Excel template. Important to note, that the usernames were stored on the laptop of the participant and used only during the interview. This task-driven approach was chosen to elicit information

per classified dangling social relationships. The interview was divided into two parts. The first part included measures for the first-added 100 usernames to examine the participants' indication of the relationship, the emotional bonding and valency of sharing posts. In the second part, the participants were asked to perform a self-developed recollection task to discover investment in mental capacity for the first-added 20 usernames with previously indicated high valency. After all tasks, the participants were debriefed. As mentioned before, the usernames were deleted from the Excel file and the pseudonymized Excel file, and all digitally signed sheets were sent to the researcher.

Measures

Qualitative data from the task-based interview were transcribed verbatim in the form of quotes. The quantitative measures are described below. In short, these measures were developed and used to discover the potential influence DSRs have on the ego network.

Existence. In order to find DSRs we let the participants indicate the sort of relationships per username for the first-added 100 usernames. The participant could choose out of social relationship, parasocial relationship, dangling social relationship or other.

Emotional bonding. We used the emotional bonding scale to measure the emotional bonding with the indicated DSR. The scale is widely used in this research area (Dunbar, 2016; A. Sutcliffe et al., 2023) and is a 10-item rating scale with the numbers from 1 till 10 (10 being the most emotionally bonded).

Cognitive capacity. To measure cognitive capacity, we used a scoring scale as result of a self-developed recollection task. For this self-developed task, participants were asked to write down three keywords to describe the most recent posts of a dangler and once done, the researcher and participant went to the profile of the corresponding dangler to check if the keywords matched the content. Participants could score 0 to 3 out of 3 (3 being all 3 keywords match the most recent content). The score was developed as proxy to indicate recent cognitive capacity spent on dangler. The task was executed by the participants for the firstly-added 20 danglers whom had a high valency of sharing self-disclosure posts. The valency was measured in the first part of the

interview were participants were asked to self-report which DSR they found to appear frequently on their timeline.

Field experiment

Participants' characteristics & procedure

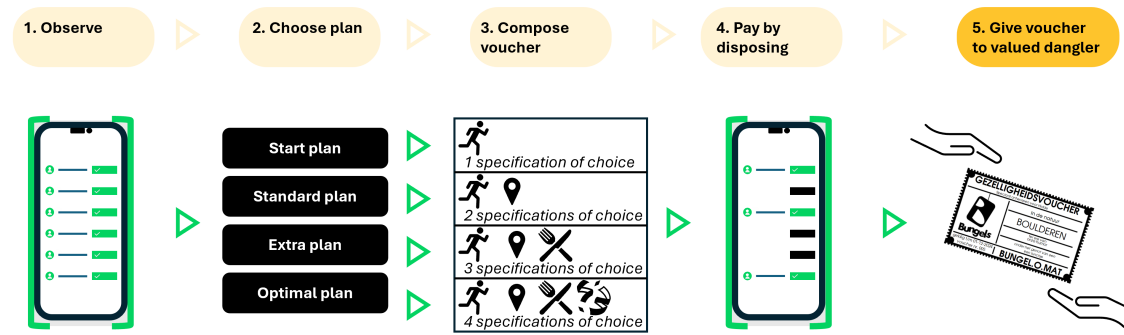
A total of 7 participants, all visitors of *Culturele Vrijhaven de Nijverheid* in Utrecht, the Netherlands, participated in the experimental setup.



Figure 3

Pictures of participants interacting with Bungel-O-Mat

The test days took place on 2nd, 14th and 15th of August 2024. The experimental setup was framed as a vending machine and was named the Bungel-O-Mat (See Figure 3). By interacting, the participant could obtain a friendship experience voucher to invest in a valuable dangler by dropping online-disposable dangling social relationships on the spot. The currency for this trade was the investment in social time and mental capacity (See Figure 4 for a visual explanation). This setup was chosen because the act of dropping dangling social relationships on the spot forces the participants to critically think about their emotional bonding with those. Especially, if the offer is considered for a friend (Van Lange et al., 1997) and there exists a possibility to share the offer with the friend-in-question afterwards (Curran et al., 2016).

**Figure 4**

Visual explanation of voucher system of Bungel-O-Mat

The Bungel-O-Mat was set up at in an exhibition space with other interactive artworks. It was designed to be self-inviting for participants. Participants could walk up to the machine to participate independently. A short explanation was given, thereafter participants were asked to give their informed consent and to insert their own mobile phone next to the screen of the kiosk. The experiment took about 10 minutes per participant and was divided into three stages: orientation, exploration, decision and finalization. For the orientation, participants were invited to scroll through their following list on Instagram and explore their list to find possible dangling social relationships. The system asked the participants their estimation of the total number of social relationships and an estimation of with whom they are in a DSR of this network. The name of the valued dangler for whom they would like to make this voucher was also asked.

Next for the exploration, participants were asked of whom of those DSR they would like to undertake an activity in the offline world. With this valued dangler in mind, the participant was asked how many danglers they would be willing to drop to make a friendship experience voucher for the friend-in-question. Next for the decision phase, participants could chose between four plans; S (1 dangler, 1 option), M (number of danglers indicated in previous question, 2 options), L ([number of danglers indicated] x 1.10, 3 options) and XL([number of online social network] - 150, 4 options). The more the participant was willing to pay, the more personalized the voucher could be. Next, the participant could make the personalized activity voucher, containing details

such as type of activity, location, consumption, and timeframe. In the final stage, the participant was asked to drop the number of dangles as stated on the terminal on their mobile phone. After confirmation of the trade-off and the voucher was printed, the participant was asked if he/she truthfully dropped the number of usernames indicated and if these usernames were dangles. The goal of the participant was to acquire a satisfactory trade-off between online-disposable dangles and a personalized voucher.

Measure

Emotional bonding. We used the voucher system to discover a number of dangles with the lowest emotional bonding and one dangle with a high emotional bonding.

Results

The data gathered with the study is described in this section per studied measure. For every measure is first indicated in which method it was studied before results are described. The results entail evidence for the existence of dangling social relationships and the kind of characteristics they have. It describes if time and cognitive capacity is invested in DSRs. Lastly, it is described that emotional bonding varies per dangling social relationship.

Existence

All participants of the questionnaire recognized the concept and out of 41 participants, 38 said to have such relationships on Instagram. The others clarified to actively delete connections with whom they no longer interact. The number of estimated DSR per participant ranged between 2 – 100+ ($M = 65$, $SD = 25$). The results of the interviews also confirm the existence as the three participants indicated 195 out of 324 analysed connections to be a dangle. Additionally, we found that DSR accounts for an average of 14 % of the total percentage of the online ego network. And an average of 19,19 % in regard to all self-reported online social relationships of the online ego network. This data shows a positive indication of the existence of dangling social relationship.

Properties

With the use of the questionnaire we found that the chances of resuming interaction with any of the DSRs were small and dispersed ($M = 21,37\%$, $ST = 18,14$). Out of 38 participants, 31 participants would be likely to say "hi" in-person to dangles seen in real life. About less than half of the participants would start a conversation (45%) and about a third (34%) would talk about the things they posted during such conversations. In the digital realm, only half of the participants would show reciprocal behavior if dangles would like or comment on their posts, but most (76%) would be likely to respond to a personal message. The main motivation for following DSR is out of interest (61%). Furthermore entertainment (50%) and reciprocity - because they follow me too - (39%) scored high. Moreover, participants stated to be undecided (might or might not) about letting either the system ($M=2,74$, $ST=1,18$) or themselves ($M=2,87$, $ST=0,96$) delete dangles with whom they assume to have no future dyadic communication. The duration of dangling social relationships confirm to be at least already existent for 2 years and some for more than 10 years ($M = 8,16$ $ST = 3,98$). These results are complemented by the data of the interviews in which the duration of the DSRs range between 2-12 years ($M = 11$, $ST = 1$). All with all, the results of this study confirm DSR already exist for a long time and will keep on existing as people are indecisive to dispose dangles and are not likely to restart interaction with most of them.

Social time

The results of the questionnaire indicated a relative time investment in DSR of 4,62 % on average in regard to time spent in both digital and non-digital activities. Time investment in DSR in relation to social time spent on digital time was 11,40 % on average. See table 1 on the next page for the average in minutes. These results show social time is spent in maintaining DSR.

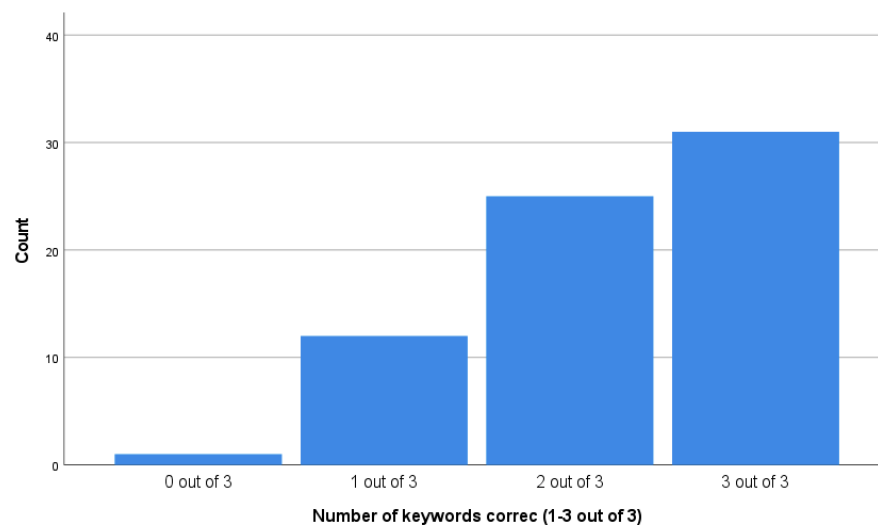
	Mean minutes of social time invested
Consumption of self-disclosure content of DSR	20
Digital activities	175,5
Non-digital activities	257,5

Table 1

Estimated minutes of social time spent per day

Cognitive capacity

This measure was only measured during the interview. Of all dangles from the three participants almost half were self-reported to have a high valency of posts. This indicates the potential of cognitive capacity investment of dangles. Participants scored high on the recollection tasks, meaning they memorized the most recent posts of those dangles with high valency (See Figure 5). A small correlation was found between cognitive capacity and emotional bonding. This shows that participants feel relatively more emotionally bonded to dangles with a perceived high valency than those with low valency. Overall, the results of this measure complement the expectation that cognitive capacity is invested in dangling social relationships.

**Figure 5**

Count per score of the guessed keywords matched the content of the most recent posts

Emotional bonding

This measure was measured during the questionnaire, interview and field experiment. Participants of the questionnaire did overall agree ($M=3,79$, $ST= 1,02$) that following DSR instead of not following probably increases emotional bonding. The questionnaire data however did not show whether participants thought the following DSR influences ($M=3,24$, $ST= 1,15$) or increases ($M=3,13$, $ST= 1,21$) the emotional bonding for DSRs in general.

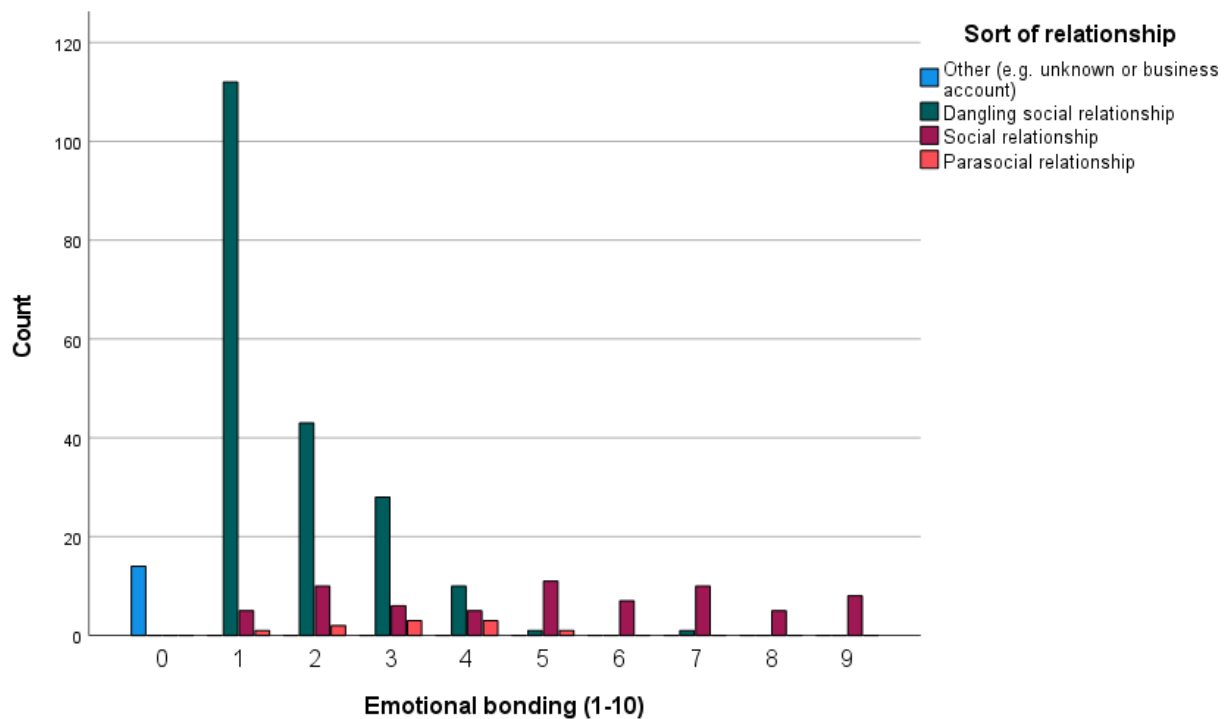


Figure 6

Count of emotional bonding per different relationship

The results of the interviews found a score of emotional bonding between 1-7 for dangles. In Figure 6 above, the count of indication of emotional bonding is given per different relationship indicated by the interviewees. These findings confirm a variety in emotional bonding towards DSR. On average the participants did not feel emotionally attached to the dangle, but for some a higher emotional bonding was given than for other social relationships. Additionally, emotional bonding was perceived to be relatively higher for those dangles interpreted to have a

high valency of posts in comparison to those with a low valency. However, high valency did not imply high emotional bonding score, suggesting investment in cognitive capacity is not correlated to emotional bonding. Quotes noted during the interview support this finding ¹. Lastly, the interviewee with the lowest number of followees on Instagram self-reported a significantly higher emotional bonding and brain capacity spent on total DSR than the interviewee with more than six times as many followees.

All seven participants of the field experiment understood the potential influence of dangles on their ego network as they all willingly sacrificed dangles for the trade of a friendship experience voucher with a valuable dangle. Additionally, this result also supports the hypothesis that users do remain connected with at least one dangle they would rather see as a social relationship, because they printed a voucher for a specific dangle with whom they would like to do an activity. The seven participants of whom data was obtained disposed on average 7 ($M = 3$, $ST = 8.7$) dangles. This data supports the hypothesis that users remain connected with dangles with whom they have no emotional bonding. Overall, all three methods showed a variety in emotional bonding towards dangling social relationships.

¹ "I have no emotional attachment to her, but she is super present in my social brain" - interviewee 1;

"she posts so much, I really have no interest in her" - interviewee 1;

"she recently had a baby, so now I'm all invested in her posts" - interviewee 1;

"I don't even know if she knows who I am anymore, but she does score a 3 on emotional attachment" - interviewee 3

Discussion

In this study, we examined the existence and properties of dangling social relationships. The method to study this phenomenon was extensive and exploratory. Many self-developed measures were used, so results may not be robust. Additionally, the sample size was small. For this reason, no correlations were drawn with demographical data or in between measures, and only descriptive statistics were performed. The results found however do capture the phenomenon, and show future research needs to be performed to further discover the potential impact on the ego network.

The study confirms that SNS users have several relationships they have not interacted with for over a year but passively consume self-disclosure posts on Instagram. The use of SNS over the years thus resulted in dangling social relationships that are at least maintained one-sided and have existed for several years. The data of this study implies SNS users invest time and cognitive capacity in these relationships. This, in turn, indicates that less time and mental capacity is available for social relationships, as the SBH argues humans have a limit in these. This study suggests that the overall effect of Instagram and other SNSs on egocentric social networks exists, conflicting with previous research (Dunbar, 2016; Dunbar et al., 2015; A. G. Sutcliffe et al., 2018) in the ego network from an SBH perspective. In other words, the observation of dangles showcases that SNS influence the structure of the egocentric social network, as time and cognitive capacity are not solely invested in social relationships users interact with and feel emotionally bonded but also in those relationships of which content is passively consumed on SNS.

Further, the study aimed to discover how dangles affect the current model of the ego network regarding the potential of one-sided emotional bonding. The participants from the questionnaire participants self-reported an increase in emotional bonding on dangles compared to acquaintances with whom interaction had ceased and no self-disclosures were consumed. Also, the dangles with a high score of emotional bonding found in the interviews indicate passive consumption of self-disclosure content can maintain, or potentially enhance, a relationship, in line with previous research in parasocial relationships (Dibble et al., 2016). The data from the

interview indicate that SNS users invest time and cognitive capacity in those dangles with high valency. However, the results do not show if valency is correlated to investment in time and cognitive capacity. Further research should be done to confirm the suggestion that the valency of posting self-disclosure content influences in whom users invest time and cognitive capacity. This behaviour could indicate that the alter is responsible for relationship maintenance rather than the ego. Only if the alter shares self-disclosure posts, does the ego have the opportunity to invest time and cognitive capacity in the alter, and maintain the relationship. We found participants do not equally invest time and cognitive capacity in all posts. It could be that not all self-disclosure posts of dangles are seen or remembered. The interview data suggests that the number of connections on SNS influences the investment in time and cognitive capacity. The participants with the lowest number of followees on Instagram self-reported a higher emotional bonding and brain capacity spent on total DSR. These results complement the limit in social time and cognitive capacity of total network (Dunbar, 1992). One potential explanation for this could be that if there is a self-disclosure content overload of posts on SNS the users filter which posts to invest in, while if there is a lack of self-disclosure content the user invests total time and cognition in all posts simply as they are available.

Lastly, the emotional bonding of dangles was scattered. Both dangles with low and high emotional bonding were found during the interviews and field experiment. The emotional bonding was for some higher than some social relationships one would indicate in the active network of Dunbar's circles of friends. These results could imply a more dispersed placement of dangles inside the egocentric social network. However, emotional bonding did not seem to be correlated to investment in time and cognitive capacity, dangles with a low score of emotional bonding but high valency and high score in cognitive capacity were found. This finding implies that on SNS one may invest much time and mental capacity in a relationship while not feeling emotionally bonded with the other. It could be because of the rise in SNS use and features of these platforms, that users invest a lot of time and cognitive capacity in dangles they feel not or lightly emotionally bonded to, which they would preferably spend in other relationships. We

could argue the field experiment was the first attempt to capture this social satisfaction through the voucher system because participants were willing to sacrifice disposable dangles for a valued dangle on the spot. It would be of merit to further research the possible impact DSR with low emotional bonding can have on the ego network. Furthermore, this variety in emotional bonding proves that it would not be accurate to place dangles inside Dunbar's circles of friends solely based on emotional bonding. We therefore advise further research in developing a new measure which captures the investment of time and cognitive capacity for both passive consumption of self-disclosure posts and interaction. This would allow a modern model that includes all kinds of relationships people have in one's egocentric social network. Only if this measure is developed emotional bonding can be applied to define the intimate layers - Dunbar's circles of friends - inside the egocentric social network.

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