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Commentary

Comment on relationships and the social brain: Integrating psychological and evolutionary perspectives

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This article is a commentary on 'Relationships and the social brain: Integrating psychological and evolutionary perspectives' (Sutcliffe, Dunbar, Binder, & Arrow, 2012).

Sutcliffe, Dunbar, Binder, and Arrow (2012) have produced important observations and theory, tying together what were otherwise stylised and loosely connected facts about personal relationships, interpersonal communication, network size, social support, and trust. They observe that people's social ties can be classified into levels of decreasing intimacy, from the most intimate support level, to sympathy, affinity, active network, and on to the clan level. The amount of social interaction and support increases with increasing levels of intimacy, while the number of people in each level increases with decreasing levels of intimacy, with approximately five alters at the support level, 15 at the sympathy level, 50 at the affinity level, 150 in the active social network and 500 at the clan level.

According to their theory, the differing network sizes across levels reflect trade-offs between resources needed to maintain ties at a certain level of intimacy and the benefits these ties provide. Resources consumed increase roughly linearly with the number of ties, but benefits increase with diminishing returns. The trade-offs operate at two time scales: a contemporary one, where the time, effort, and other resources required limit how many ties the individual can maintain, and an evolutionary scale, which has resulted in a slow-to-change human brain size that has a bounded capacity for keeping track of the information needed about the relationships at each intimacy level.

Writing from an evolutionary perspective, Sutcliffe *et al*. (2012) attempt to explain population-level phenomena. However, this approach risks falling prey to the ecological fallacy, in which patterns observed across the population might not apply to individuals within it. In particular, the authors' 'ratio of three' of active network size at adjacent

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intimacy levels is based on measures of central tendency averaged over many individuals. Although their theory emphasizes the costs that could shape active network size at the individual level, their empirical observations do not account for individual differences, or other factors that might contribute to variation. One possible inference from their theory is that reductions in the cost of maintaining ties, such as through the use of social networking services, should increase the number of ties people maintain at any intimacy level. However, the authors do not believe in this increase: 'there is scant evidence of any capacity increases in relationship numbers [through the use of computer-mediated communication]' and there is 'little evidence to suggest that many of these extra relationships [supported by social networking services] are active in the social sense'.

We argue that many of the ties supported by social networking services are indeed socially active and that individual differences in the size of active networks at different levels of intimacy are large and demand explanation. To illustrate this variability and the socially active nature of the ties, we analysed interaction data from Facebook. Facebook is one of the most popular social networking services in the world, with over 750 million people using the service each month. Communication between people on Facebook is highly correlated with self-reported intimacy (Gilbert & Karahalios, 2009). Because people must actually use Facebook for their behaviour to accurately reflect intimacy, we restricted our sample to heavy users, the 30% of monthly actives who have been on Facebook at least 6 months and logged in at least 80% of days during the past 6 months. We then collected data about all pairwise interactions between users in the sample and their friends, over a 4-week period. All data were anonymized.

Table 1 shows the correspondence between Sutcliffe *et al*.'s (2012) levels of intimacy and roughly equivalent behaviourally defined patterns of interaction on Facebook. We identified patterns of pairwise communication that are plausibly related to variations in intimacy and whose median network size roughly corresponds to the sizes Sutcliffe *et al*. (2012) attribute to their levels of intimacy. For example, in the first row, which roughly corresponds to the authors' support layer, the median heavy user had three alters (mean = 6.3) with whom he or she had bidirectional, direct communication exchanges[1] on Facebook on at least two separate days during the 4-week period (with a median of 19 and mean of 60.2 communication events per month). We do not claim that every such relationship is a support tie or that all communication between such ties occurs on Facebook. Rather we are suggesting that our operational definitions partition ties in terms of levels of intimacy and create sets whose sizes roughly correspond to the sizes hypothesized by Sutcliffe and his colleagues.

Figure 1 shows the distributions of active network sizes plotted using a logarithmic scale for the four levels defined in Table 1. In the original, non-logarithmic scale, the distributions are all non-normal and skewed to the right. Consider the most intimate level, labelled 'Support': while a median heavy user had three alters with at least two days of bidirectional exchanges per month, 25% had eight alters with this pattern of communication, 10% had 17 and 5% had over 25. Similarly, at the other levels, 10% of heavy users had over 41 alters with whom they exchanged at least one reciprocated communication per month, 10% had over 102 alters from whom they received at least one communication in a month and 10% had at least 745 alters listed as Facebook friends.

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[1] *The direct communication category consistent of wall posts, messages, chats and pokes, actions that have designated targets and can be initiated in an unprompted manner. The communication category adds comments, likes, and tags, which constitute a form of active interaction with the target user, but function as derivative content rather than direct communication.*

Table 1. Correspondence between Sutcliffe's levels of intimacy and Facebook levels of interaction

| Sutcliffe intimacy layers			Facebook rough equivalents			
Layer name	Hypothesized number	Operational definition	Median number of alters in active network	Mean number of alters in active network	Median communications per alter per month	Mean communications per alter per month
Support	5	Pairs who have reciprocally exchanged communication explicitly directed towards alter at least twice in a month	3	6.3	19	60.2
Sympathy	15	Pairs who have reciprocally exchanged communication explicitly directed towards alter at least once in a month	10	17	5	26.6
Affinity	50	Alters for whom ego has received at least one communication during the month	32	47.7	2	14.2
Clan	500	Alters whom ego has included on a friend list, independent of amount of communication during the month	255	366.8	NA	NA
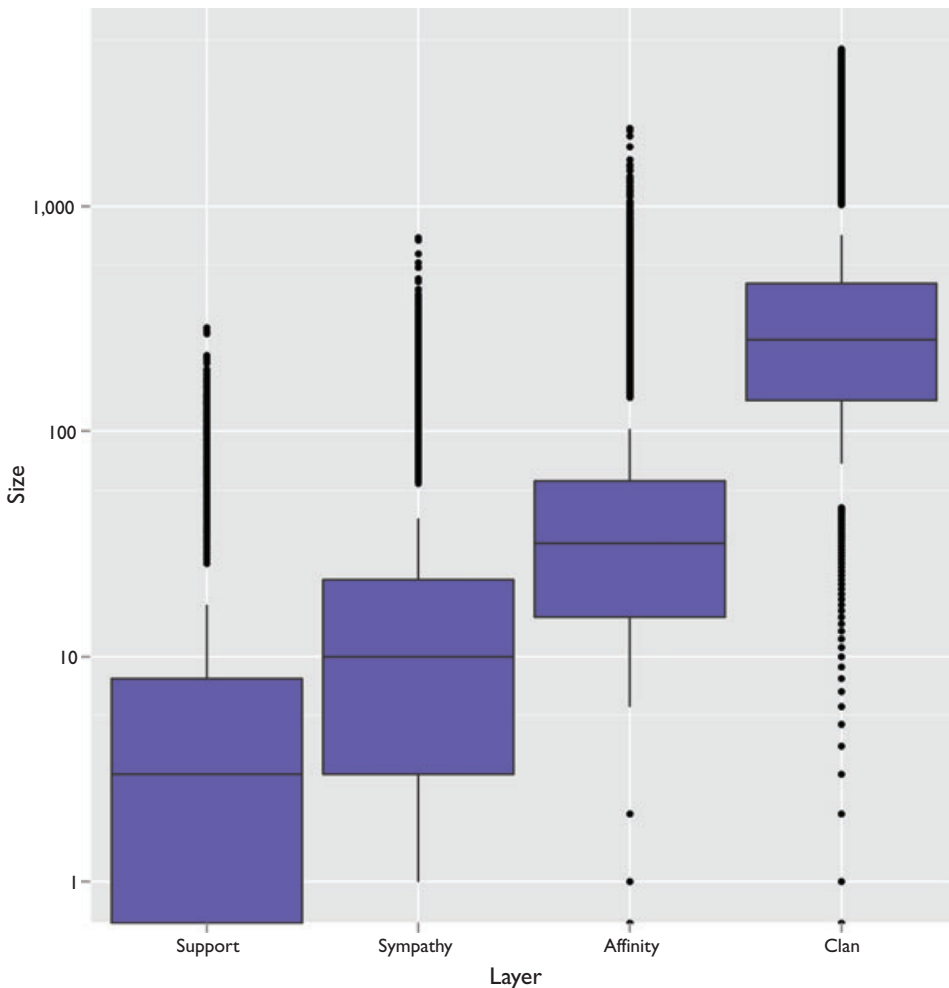
Figure 1. Distribution of network size at different levels of behaviourally defined intimacy.

The ratios between adjacent levels of active network size in Table 1 are also skewed to the right. While the median roughly corresponds to Sutcliffe *et al.*'s 'ratio of three', we find that in many cases, 10% of heavy users have a ratio more than twice this size. For example, 10% of heavy users have a ratio of at least 6 moving from the support to the sympathy level, and 10% have a ratio of 6.8 moving from the sympathy to the affinity level. When comparing the affinity and clan levels, which are two levels apart, 10% of users have a ratio of at least 18.9 where 9 is the value predicted by Sutcliffe *et al.* (2012).

Despite the authors' view that computer-mediated communication and social networking sites primarily supplement communication with close ties, the data here suggest that at least a minority of people are able to maintain many more active social network ties than one would expect from the empirical observations that underlie their theory. We had neither space nor time to investigate the factors that may explain this variation in the size of individuals' social networks. However, we speculate that social network sites like Facebook have lowered the cost of maintaining ties at various intimacy

levels. Exploring these data in more detail will allow stronger tests of Sutcliffe *et al*.'s theory.

References

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