When I heard about Kanai et al.'s paper [1] announcing a correlation between grey matter density in several brain areas and online social network size, I immediately updated my Facebook status, and touted the size of my brain in the eyes of my 500 friends. Well, Kanai et al.'s findings were not at all about its size; they were limited to very specific parts of it. Yet I must admit that I maliciously took advantage of the ignorance of some of my mates. Their reactions to my childish post were various: some of them made fun of me, some pretended to be impressed. There was inevitably a bunch of them to criticize the findings as well as my own 'interpretation' of the results. Eventually, there were also a significant number of people who threatened my concept of 'friendship'. After all, how could I have 500 real friends when, as everybody knows, one can only maintain about 150 social bonds? Even Britney Spears knows that. Rumor has it that she chose to join the social network Path where the number of interactants is limited to 150. Why 150? Path’s cofounder Dave Morin justifies this limit by quoting Robin Dunbar's work on the social brain hypothesis: this is our ‘social ceiling’. One cannot maintain approximatively more than 150 trusted relationships.

Here is the rationale behind this claim.

The high neocortex ratio we find in primates (compared to other mammals), and its critical value in humans, would be the outcome of selective pressures related to social competition. Primates have larger brains (correcting for body size) because they live in highly social worlds. Our evolutionary history thus shaped the amount of neural matter we can dedicate to social affairs, limiting our social skills and eventually the size of our networks. In 2010, support was provided to the evolutionary scenario: studying various mammal fossils, Schultz and Dunbar [2] showed that encephalization has not been a universal trend among mammals throughout evolutionary history. Instead, it was associated with sociality. More recently, some evidence was found for the neurocognitive aspect of the hypothesis: Powell and colleagues (2012) [3] have shown that a positive correlation between cortical volume of brain bits (here, the orbital prefrontal cortex which is involved in the monitoring of social cognitive demands) and the offline social network is not direct but mediated by mentalizing capacities, thus matching the actual predictions of Dunbar's hypothesis.

The fact that Path and others (e.g., the Swedish administration, when it reorganized tax collectors in 2007 [4]) use the social brain hypothesis as a basis for technical choices is not only a sign that Dunbar's number has become very popular. It also suggests that it is no longer in the hands of scientists: the move from 'observation' to 'normativity' has begun. Soon, the idea that we do have a social ceiling beyond which we cannot maintain trustful relationships will spread and contaminate policy makers. As there might no longer be any possible backward move in the future, de Ruiter, Weston & Lyons have summed up the points of view of the discontents in a recent paper published in American Anthropologist [5]. Neocortex size, they claim, should not be given the primacy in accounting for human group size and structure. This post exposes and discusses their arguments.

Can we groom beyond Dunbar's number, and therefore, beyond our neocortical capacity? Our elaborated cultural systems, the authors argued, can help us do so.
First, it would be incorrect to limit our cognitive apparatus to the borders of the cranial skull; de Ruiter and colleagues take the extended mind hypothesis seriously. They contend that the distinction we typically draw between the mind and the world often fails. Numerous mnemonic systems could allow one to make use of external resources so as to groom beyond the 150 ceiling at low intracranial cost. Kinship algebras are taken as a good example of how one can compute a very complex set of relationships between oneself and others and determine one’s social position and duties without having to hold all this information in memory. External resources would therefore be essential in making our social abilities sophisticated without depleting the brain.

Second, the authors argue that the choice of ‘grooming’-type behaviors as the basis for investigating social bonding processes has detrimental consequences on how we understand the notion of ‘social bond’. This choice (which is itself a consequence of a “phylogenetic continuity” constraint, i.e., finding a social bonding mechanism not too complex to give an account of how early hominins came to bond in an evolutionary ‘modern’ way) would narrow the definition of what a social bond is, and eventually exclude a range of other significant relationships which cannot be fostered by means of grooming-like behaviors and which would nonetheless count as true bonds from a subjective perspective. Thus, enmities or ancestor worship would not be termed social bonds, even though they are of critical importance for one’s life. This would make Dunbar’s definition ‘tautological’: if someone has more than 150 bonds, those extra bonds would not count as genuine ones.

Third, technological augmentation would provide cognitively economic ways of fostering our social bonds. Mobile phones or social-network websites would allow us to push against the 150 social ceiling. They would be much more efficient in this than are conversation and laughter (which, as for Dunbar, would have replaced non-human primate-like grooming [6]). Updating a Facebook status would just be like being able to groom dozens of individuals at one time, with minimal cognitive cost.

Thus, it would follow from these 3 main arguments than Dunbar’s number can be outreached by extracranial means: there would virtually be no cognitive limit imposed by the neural volume.

Do these arguments undermine Dunbar’s number? I do not think so, for at least 3 reasons.

First, the choice of grooming as the prototypical transactional mechanism shall not be considered as an indiscriminate choice. Evolutionary significant relationships are those than can bring coalitional support to both individuals. Support is a commitment and requires trust. Because of their psychopharmacological effects and the “neuroendocrine cascades” they trigger, grooming-like behaviors create a psychological environment that makes people feel comfortable together. Grooming-like behaviors are, in this respect, trust-builders. It follows that transactional behaviors that fail to bring these psychopharmacological effects would be useless in the fostering of social bonds. In this respect, Pollet, Roberts and Dunbar (2011) [7] have showed that Facebook does not bring any significant change in the number of bonds that one consider to be significant, probably because it fails to provide the relevant psychopharmacological effects, unless personal conversations and more classical social bonding behaviors are involved (such as conversation, which restricts the interaction to a lower number of individuals). Does technological augmentation help in building trust? Robin Dunbar suggests it does not [8]. Our personal experience in web-based social networking would probably convince us that, if Facebook is useful in enjoying a collection of virtual mates, it does not improve our social skills nor extend them.

Conversely, could kinship (or other) algebras significantly improve our social skills? Kinship algebras may be very useful in computing complex relationships and remembering our social duties towards others, but I am afraid they would not be of any help for extending our mentalizing capabilities. This brings us back to the actual rationale of the social brain hypothesis: what is important for an individual embedded in a social network is not just being able to count the number of bonds that she
has, or to compute which duty she is committed to, given her social position and the social position that bond of hers holds. This would simply depend on her memory and simple reasoning capacities (being able to compute logical relationships). It would not be very different, in terms of cognitive demands, from a non-social task, such as remembering a set of relationships between different cars and their brands. Rather, successfully navigating in a human social world requires being able to adjust one's behavior to that of others, inferring their mental states, desires and goals. In this respect, Powell et al. (2012) [3] have found no relationship between the volume of OFC (which positively correlates with online social network size) and short-term memory capacity. This suggests that successfully navigating into the social world requires much more than simply being able to compute a set of relationships. Dealing with the social world goes with mentalizing, not only with remembering [6].

Third, it is not clear at all how external mechanisms can allow for a more efficient maintenance of social bonds, given their obvious lack of "emotional" flavor. The tightening of evolutionarily relevant social bonds (bonds that can bring coalitional support) requires personal involvement and emotional closeness. This is definitely out of the scope of external resources such as kinship algebras (which are based on cold and logical genealogical relationships between kins) or web-based social networks (which do not extend the number of people we feel emotionally close to [7&8]).

Should we offer more scrutiny to popular scientific hypotheses that have a similar normativity potential? For sure, we should. But this is not specific to Dunbar's number, and more importantly, this should not undermine the scientific legitimacy that Dunbar's version of the social brain hypothesis has acquired through numerous data collections.

Sources