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Sharing the joke: the size of natural laughter groups

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Abstract

Recent studies suggest that laughter plays an important role in social bonding. Human communities are much larger than those of other primates and hence require more time to be devoted to social maintenance activities. Yet, there is an upper limit on the amount of time that can be dedicated to social demands, and, in nonhuman primates, this sets an upper limit on social group size. It has been suggested that laughter provides the additional bonding capacity in humans by allowing an increase in the size of the "grooming group." In this study of freely forming laughter groups, we show that laughter allows a threefold increase in the number of bonds that can be "groomed" at the same time. This would enable a very significant increase in the size of community that could be bonded.

Keywords: Laughter; Social group size; Social grooming; Endorphins; Social bonding

1. Introduction

Although by no means unique to humans (it occurs in great apes: Davila-Ross, Owren, & Zimmermann, 2009; Waller & Dunbar, 2005), laughter is one of the most distinctively human behaviors (Gervais & Wilson, 2005; Provine, 2001). While a number of (not necessarily mutually exclusive) hypotheses have been suggested for its function (signaling social or mating interest: Grammer, 1990; Grammer & Eibl-Eibesfeldt, 1990; Li et al., 2009; Martin & Gray, 1996; Mehu & Dunbar, 2008; emotional contagion: Bachorowski & Owren, 2001, Owren & Bachorowski, 2003; social bonding: Dunbar, 2004; Dunbar et al., 2012), laughter in humans is characteristically highly social and intensely contagious (Provine, 2001). The occurrence of laughter during an interaction also significantly increases the perceived satisfaction with the interaction (Vlahovic, Roberts, & Dunbar, 2012).

Anthropoid primates are characterized by an unusually intense form of social bonding (Dunbar & Shultz, 2010; Shultz & Dunbar, 2010) that is mediated by an endorphin-based psychopharmacological mechanism effected by social grooming (Curley & Keverne, 2005; Depue, Morrone-Strupinsky, et al., 2005; Machin & Dunbar, 2011). Social grooming (the bimanual cleaning and manipulation of a recipient's skin or fur) is limited to dyads since it is physically difficult to groom several individuals at the same time. Given this, its effective broadcast group size (the number of individuals whose state of arousal can be influenced in this way) is one. This, combined with limits on the time available for social grooming (Dunbar, Korstjens, & Lehmann, 2009; Lehmann, Korstjens, & Dunbar, 2007), seems to set an upper limit on the size of social group (or community) that can be bonded through this mechanism (Dunbar, 1993).

Laughter is known to release endorphins in much the same way as grooming does (Dunbar et al., 2012), and this has led to the suggestion that the exaggerated forms of laughter characteristic of humans might have evolved out of conventional ape laughter (Davila-Ross et al., 2009, Davila-Ross, Allcock, Thomas, & Bard, 2011) as a device for enlarging the effective size of grooming groups through a form of "grooming-at-a-distance" (Dunbar, 2012). When

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hominins evolved larger social communities than those characteristic of the most social monkeys and apes, some additional mechanism was required to make this possible. Increasing grooming time was not an option because it was already at its upper limit in primates (Dunbar, 1993, Dunbar et al., 2009), but increasing the number of individuals who could be "groomed" simultaneously is a plausible alternative. Laughter as a form of chorusing (*sensu* Burt & Vehrencamp, 2005; Schel & Zuberbühler, 2012; Tenaza, 1976) seems to fill that role admirably because it allows several individuals to be involved simultaneously. The fact that human laughter shares close structural similarities with ape laughter (Davila-Ross et al., 2009; Provine, 2001) suggests that, if it was the solution to this problem, it may have been an early adaptation, long predating the evolution of speech and language (Dunbar, 2009, 2012).

This suggestion raises the question of laughter's efficiency as a bonding mechanism relative to social grooming. Given that grooming has an effective broadcast group size of one, just how large is the broadcast group size for laughter? To determine this, we observed natural social groups in bars and collected data on the number of people who laughed together within these groups. We also sampled the size of the whole social group as well as the size of conversational groups (the number of people engaged in a conversation) to provide benchmark measures that enable comparisons between laughter and conversation (conversation groups are known to have an upper limit of four individuals, irrespective of the size of the social group: Dunbar, Duncan, & Nettle, 1995).

2. Method

We censused natural social groups in bars in the United Kingdom (Oxford; 80% of the observations), France (Calais, Lille, and Paris; 14%), and Germany (Berlin; 6%), distinguishing social *group size* (the total number of individuals present as an interacting group), *conversational subgroup size* (the number of individuals within the social group taking part in a particular conversation, as evidenced by speaking or obviously attending to the speaker, following Dunbar et al., 1995), and *laughter subgroup size* (the number of individuals laughing in an obviously coordinated way, following the same definition as for conversational subgroups). Individuals were said to be laughing when they were producing the vocalization which is characteristic of laughter (i.e., a series of rapid exhalation–inhalation cycles: Davila-Ross et al., 2009; Provine, 2001). In total, 501 observations of laughter events were sampled from 450 groups.

Groups of at least two people were covertly observed from a close distance (maximum 5 m). A group was selected if it was stable over time and the faces of all members were visible to the observer. As soon as a burst of laughter was produced within the group, the laughter subgroup size was censused, defined as the number of people who produced at least one laughter vocalization before laughter ceased within the group. We also censused the size of the conversational subgroups: individuals were scored as being a member of a given conversational subgroup if they were speaking or paying attention to the speaker (as indicated by direction of eye gaze). Finally, we noted down the size of the social group within which these were embedded (as evidenced by the affiliative interactions among the members over the whole period the group was under observation). While laughter and conversational subgroup sizes could be censused via rapid visual scans, group size censuses required longer and more persistent observation. Groups were censused at 30-min intervals to guarantee the statistical independence of each sample. Nevertheless, groups could be reconsidered for a census before the 30-min interval if they permanently lost or gained a member.

2.1. Statistical analysis

Due to the small number of observations at larger social group sizes, data were merged for groups of size 7 to 8, 9 to 10, and 11 to 14. To estimate the optimal size of conversational and laughter subgroups, we performed a series of regression analyses, using the Akaike information criterion (AIC) (Akaike, 1974; Burnham & Anderson, 2002) to select the function that gave the best fit.

3. Results

Fig. 1 plots the frequency distribution of social, conversational, and laughter subgroup sizes. Average conversation subgroup size was 2.93±0.05 S.E. (N=501), and average laughter subgroup size was 2.72±0.04 S.E. (N=501). Conversational subgroups larger than 5 were rare (2.8% of the observations), and none were larger than 10. Similarly, laughter subgroups larger than four were rare (5.6% of the observations), and none were larger than six.

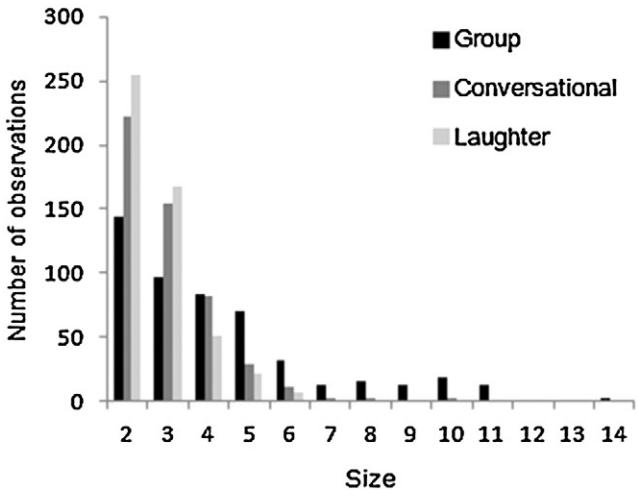

Fig. 1. Frequency distribution of social groups, conversation subgroups, and laughter subgroups.