

Laughing, grooming, and pub science

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On the basis of naturalistic observations of people conversing and laughing in pubs, a new study suggests that the ‘grooming-at-a-distance’ of laughter provides a three-fold increase in grooming group size, potentially explaining how hominins evolved social groups that are considerably larger than those of other primates.

In a new study published in the journal *Evolution and Human Behavior*, Dezechache and Dunbar answer a burning question: what can be learned while tossing back a few pints at the local pub [1]? As it turns out, quite a lot. The authors provide a rich and novel introduction to a variety of issues in social science. The research is an outgrowth of Dunbar’s research about optimal group size and the behaviors necessary for humans to maintain much larger group sizes (approximately 150) than other primates. Their premise in the present article is that laughter is a form of vocal grooming and bonding of humans that enables an increase in the size of a social group beyond that permitted by ancestral, manual grooming. Laughter, like conversation, provides ‘grooming-at-a-distance’.

Laughter is a fragile behavior that can vanish under scrutiny in the laboratory. Appropriately, the authors sought it among *Homo sapiens* observed in the wild, primarily in the pubs of Professor Dunbar’s native Oxford, but also a few bars in France and Germany. The analysis is based on behavior observation and the contrast of the size of two types of freely forming groups in these settings, one of individuals engaged in conversation and a subset who are laughing together. On the basis of 501 laughter events sampled from 450 groups, the authors concluded that conversational groups had an average size of 4.21 individuals compared to the subset of laughing groups that had an average size of 3.35 individuals. Both types of groups are larger than the dyads of manual grooming. On first hearing, these may seem modest discoveries, but in telling their story, the authors cover a lot of interesting material about group behavior, joking, and laughing that I will relate, adding some evolutionary and social context.

Comparative studies indicate that laughter is literally the sound of the labored breathing of rough and tumble play, such that the pant-pant of our primate ancestors evolved into the human ha-ha, with the sound of laughter signifying the playful circumstance of its origin. Laughter is a kind of primate onomatopoeia. Accounts of how laughter emerged and its significance for speech evolution are provided by Provine [2,3] and Davila-Ross and colleagues [4]. The facts about origins [5] help counter the florid theorizing that often accompanies speculation about the

nature and function of laughter and humor. Laughter, like speech, evolved to change the behavior of other people, not to improve one’s health, reduce stress, and so on, although it may have later acquired such secondary functions.

Laughter is an adaptive vocalization that signals that one’s intent is play, not assault, and may prevent a punch in the face or knee to the groin. However, we should not try to put a fine edge on this primitive primate vocalization, recalling that it also has a dark side used in jeering and ridicule that is used to shape up or drive away outliers. Humor [6,7] is a relatively modern cognitive and linguistic contrivance used by humans to stimulate laughter among group members – and presumably bond, according to the authors [1].

The study of laughter and humor is full of counter-intuitive findings. The laughing companions in the pubs of the present study were probably not telling each other jokes at a furious rate. Most conversational laughter follows mundane comments such as ‘I have to go now’, not jokes or other attempts at humor, and speakers often laugh more than their audiences – facts easily confirmed by observing your own conversations [2]. At several levels, therefore, standup comedy in which a non-laughing speaker tells jokes to a laughing audience fails as a model for everyday laughter.

Further, laughter, like crying, is under weak voluntary control, a fact easily confirmed by asking someone to laugh. People typically respond that they cannot laugh on command or make an attempt at obviously fake laughter [2]. Thus, we should be skeptical of people’s *post hoc* confabulations, however well-intentioned, that attempt to rationalize the irrational act of laughter. Laughing is not a matter of speaking ha-ha. Sometimes the mere sound of laughter is sufficient to trigger a bout of contagious laughter, synchronizing group laughter in what the authors term ‘chorusing’ [1]. Naturalistic behavior observations of the sort conducted by the authors are a more informative approach to such instinctive, primate play vocalizations than visiting a comedy club or trying to figure out why a joke works. The pub setting is also ideal for determining whether the vigor and size of laughter choruses are primed by alcohol.

Dezechache and Dunbar are particularly interested in the social utility of laughter, suggesting that it, like conversation, permits ‘grooming-at-a-distance’ and the amplification of social bonding beyond the dyad of ancestral, manual grooming. Customers in Oxford pubs would appreciate that vocal grooming is less physically intimate, preventing the alarming prospect of being manually groomed by a stranger named Nigel sitting at the next barstool. The authors suggest that laughter may have evolved to ‘break through the ceiling imposed by more

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conventional primate bonding processes'. Building on previous research, they add that laughter is ideal for bonding because it can be performed simultaneously by several individuals, also permitting group members to share in a presumed endorphin release.

Although not explored in this paper, Dunbar and others have examined truly long distance social relations, and presumably grooming and bonding, achieved through the technological prostheses of media, from the letter writing of antiquity to modern social media. However, if you crave a more primal, low tech, laugh-related social experience, you can try tickle, a neurologically programmed behavior that binds us together in the give-and-take of rough and tumble play. This would best not be explored in the pub.

References

- 1 Dezecache, G. and Dunbar, R.I.M. (2012) Sharing the joke: the size of natural laughter groups. *Evol. Hum. Behav.* 33, 775–779
- 2 Provine, R.R. (2000) *Laughter: A Scientific Investigation*, Viking
- 3 Provine, R.R. (2012) *Curious Behavior: Yawning, Laughing, Hiccupping, and Beyond*, Belknap
- 4 Davila-Ross, M. *et al.* (2009) Reconstructing the evolution of laughter in great apes and humans. *Curr. Biol.* 19, 1106–1111
- 5 Gervais, M. and Wilson, D.S. (2005) The evolution and functions of laughter and humor: a synthetic approach. *Q. Rev. Biol.* 80, 395–430
- 6 Hurley, M.M. *et al.* (2011) *Inside Jokes: Using Humor to Reverse-Engineer the Mind*, MIT Press
- 7 Martin, R.A. (2007) *The Psychology of Humor*, Academic Press

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<http://dx.doi.org/10.1016/j.tics.2012.11.001> Trends in Cognitive Sciences, January 2013, Vol. 17, No. 1

Prefrontal alpha- and beta-band oscillations are involved in rule selection

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A recent study in monkeys reports that oscillatory neuronal synchronization between ensembles of prefrontal neurons is involved in rule selection. The study demonstrates that beta-band synchronization (19–40 Hz) reflects the selection of a rule, whereas alpha-band synchronization (6–16 Hz) reflects the active inhibition of a not-to-be-applied rule.

In daily life, people are often confronted with situations where different rules need to be applied depending on the context. For instance, the head of a hammer is used to drive a nail, whereas, in order to extract a nail, the claw must be used instead. In multilingual settings, different rules are used to interpret speech depending on the language spoken. Behavior in social settings is also dominated by context-dependent rules. For instance, one acts differently when having lunch with one's spouse than when having lunch with one's boss. Although it is well-established that the prefrontal cortex (PFC) is involved in rule selection [1], little is known about the underlying neurophysiological mechanisms.

Buschman *et al.* [2] conducted a study in which they recorded from multiple electrodes implanted in the dorso-lateral PFC of monkeys. The monkeys were cued to perform either a color or an orientation discrimination task. This constituted 'the rule' (Figure 1a). The cue was followed a few hundred milliseconds later by the target stimulus, which was composed of a colored bar with a given orientation (Figure 1a). After the target stimulus was presented, the monkeys were trained to make a saccade to the left or

right depending on the rule. For instance, if the color rule was to be applied, the monkey had to make a right saccade in response to a red bar and a left saccade for a blue bar. When the orientation rule was applied, the monkey would make a left saccade for a vertical bar and a right saccade for a horizontal bar. This paradigm allowed the investigation of neuronal activity associated with rule selection before and during the presentation of the target stimulus.

The authors found that the local field potentials (LFPs) of a subset of the electrodes synchronized in the higher beta band (19–40 Hz) around stimulus onset when the color rule was applied (Figure 1b, blue traces). When the orientation rule was applied, LFPs from a different set of electrodes synchronized in the same frequency band. Crucially, when the more difficult color rule was applied, the researchers observed pre-stimulus synchronization in the alpha band (6–16 Hz) for electrodes showing a preference for the orientation rule (Figure 1b, red traces). The oscillatory activity had consequences for behavior: especially stronger alpha-band synchronization allowed the monkeys to perform the task faster. In line with the behavioral effects, the higher the anticipatory alpha power for the orientation ensemble, the higher the spike rate of the color-rule ensemble during stimulus presentation. Additionally it was demonstrated that neuronal spiking was phase-locked to beta oscillations. The phasic influence of alpha oscillations remains to be further characterized. According to the pulsed inhibition hypothesis [10], the spiking activity of the orientation-selective neurons should be constrained by the phase of alpha oscillations in the pre-stimulus interval when preparing for the color rule.

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