



Research Letter from: ... England

# The Cat Is Boss

By our corresponding author, **Molly Felis**

**R**enowned as a nation of animal lovers, the English pour more of their affections onto cats than any other pet. Much time has been lost speculating upon the real character of these furry housemates, who can combine aloofness and behaviour verging on the anti-social. Now, there's proof that, as long suspected by dog lovers, domestic cats are in fact rather manipulative of all those little old ladies they're shackled up with!

Karen McComb from the University of Sussex has just published her findings on "The cry embedded within the purr" (*Current Biology* 2009, 19, R507-508), in which she has evidence that cats are indeed training their owners. It seems that domestic cats make subtle use of one of their most characteristic vocalisations, purring, to solicit food from their human hosts, exploiting sensory biases that humans have for providing care.

McComb, from the Psychology Department's Centre for Mammal Vocal Communication, usually spends her time listening to more exotic animals, like elephants, lions and Barbary macaques. But one day, particularly annoyed by the insistent purring of 'Pepo', her own cat, she began posing questions closer to home. "I wondered why this purring sounded so annoying and was so difficult to ignore." She began talking with other cat owners, only to discover that some also had cats, which showed similar behaviour. (You can even judge how annoying *you* find 'Pepo's purr' by listening to it online at [www.lifesci.sussex.ac.uk/cm-vcr/Domestic\\_cats.html](http://www.lifesci.sussex.ac.uk/cm-vcr/Domestic_cats.html).)

McComb was determined to discover why her cat's purr was so aggravating. She convinced other cat owners to record their own irritating felines in the "normal home environment", then selected ten (5 male, 5 female, aged between 9 months and 14 years). 'Pepo' was not alone. "When humans were played purrs recorded while cats were actively seeking food at equal volume to purrs recorded in non-solicitation contexts, even those with no experience of cats judged the 'solicitation' purrs to be more urgent and less pleasant."

## Purr ranking

McComb chose two distinct purr types: solicitation and non-solicitation. The former is interpreted as the cat "soliciting for food". It wants something. Typically, the "cat initiates approach and orients towards its owner/observer; gaze focussed on the owner/observer; an alert stance is adopted". Understandably, the non-solicitation purr may not sound quite as intimidating in comparison since the cat is "either settling down to rest, or sitting on blanket/bed, or being petted. No direct cat initiated approach; no particular orientation; gaze not focussed

on owner/observer". In other words, standard self-satisfied cat behaviour.

Fifty human participants (25 of each sex, 18 to 46 years old) were sat down with "Koss Porta-Pro headphones" and asked to listen to the cat purrs "edited down to 5 second sequences". Using "Multiple Forced Choice experiment scripts in Praat DSP software", two psycho-acoustic experiments were conducted. In the first, listeners were played all "purr stimuli" and asked to independently rank each purr for pleasantness and urgency "on a seven point Likert scale". In the second, listeners were played pairs of purrs, each being a solicitation/non-solicitation purr from the same cat.

## More effective than dogs

"Participants consistently judged the solicitation purrs to be more urgent" (4.7 vs. 3.3) "and less pleasant than the non-solicitation purrs" (3.5 vs. 4.5). However, individuals that had owned a cat did perform significantly better than non-owners, "suggesting that the ability to identify these purrs can improve through learning". Quite!

So, how do cats succeed in getting us to jump up and feed them? McComb performed a detailed digital acoustic analysis of all these recorded purrs looking at the underlying "purr rate, variability in purr beat length, harmonicity", etc. The key difference in the acoustic structure of paired purrs was the presence of a frequency peak (range 220–520 Hz, mean 380 Hz) that was particularly pronounced in solicitation purrs. This peak was taken to indicate "voicing (activation of the vocal folds via air movement), at a frequency more typical of a cry or meow, occurring alongside the unusual low frequency muscular activation of the vocal folds that gives the purr its extremely low (~27 Hz) fundamental frequency".

She then performed "purr re-synthesis" on one complete inhalation/exhalation phase of a solicitation purr from each of the ten cats, digitally removing the distinct "voiced peak" from each purr. These appropriately neutered purrs were played back to the listeners in paired presentations: neutered solicitation/non-solicitation – the re-synthesised purrs were now perceived as significantly less urgent.

McComb reckons that the inclusion of the voiced peak within the purr could serve as "a subtle means of exploitation" – the cats have learnt to imitate the wails of hungry/distressed human infants. Subtle?

Not that cats waste their subtlety, "Cats exhibit this behaviour in private with their owners, typically at anti-social times, such as first thing in the morning. In large households where there is a lot going on, such purring might get overlooked. Meowing seems to be more common in these conditions".

McComb told the *Guardian* newspaper that the cat's special purr was more effective than a dog's bark. In the morning, most cat-owners get up and feed their cats – even before they have a cup of coffee! "Cats are very good at getting their own way."

