

## VOCAL COMMUNICATION IN GIBBONS

ESTHER CLARKE

*Department of Anthropology, Durham University, Dawson Building, South Road  
Durham, DH1 3LE, UK*

ULRICH H. REICHARD

*Department of Anthropology and Center for Ecology, University of Southern  
Illinois, USA*

KLAUS ZUBERBÜHLER

*Department of Psychology and Neuroscience, University of St Andrews,  
Scotland, UK*

Many non-human primates use vocal communication referentially and also use simple syntax and grammar. However, their comparative vocal repertoires are disappointingly sparse, with many researchers concluding that they have fixed vocal patterns made up of a limited number of discrete units used in a relatively small array of contexts (see McComb & Semple, 2005 for a review). Furthermore, these vocal patterns seem to be innate, under high genetic control with little evidence for vocal learning – something that humans are masters at (Janik & Slater 1997). This leaves us with some questions. Firstly, how did humans become so adept at producing and learning vocal sounds? And, secondly, are there any extant primate species with vocal behaviours that can be directly compared to our own?

In answer to the first question, singing is a human behavior which has the potential to have been an important element in the evolution of human language; we argue that it shaped the vocal tract, endowing us with among other things, breath control and a flexible oral cavity – both central to human speech. Singing could have also enhanced cognitive abilities such as memory and sense of rhythm. The idea that language evolved from a musical proto-language is not new, and evidence for the memetic selection of singing competency is compelling (Vaneechoutte & Skoyles 1998). Additionally, Darwin (1871) and Jespersen (1922) argued that man's earliest utterances were probably song-like, and more recently, Fitch (2006) argued that kin-selected musical motherese may have served as a prelude to language. However, in answer to the second

question, there have been no comparative studies of song evolution in non-human primates, possibly because singing is a relatively rare behaviour. None of the great apes sing, suggesting that either human singing ability evolved independently, or that great apes have secondarily lost this behaviour. Gibbons, as one of only four primate taxa that sing, and the only ape to do so, are an extremely diverse phylogenetic family and as such offer an excellent potential model for the evolution of primate singing. Gibbon song also offers a promising way to test Jespersen's (1922) theory that, before language, early human song encoded semantics by attaching propositional meanings to whole song phrases rather than individual notes or syllables; if gibbon song does the same, we can use it as a proxy for early song-like communication in humans.

Our research has shown that gibbon songs are used flexibly for functionally referential communication (Clarke et al. 2006). Their songs consist of a limited number of units, which are combined in meaningful, rule-governed ways including sex-specific phrases (Clarke 2010). We propose that gibbon song, shaped by sexual selection, has been secondarily adapted to function as a more general communicative tool. This is discussed in comparison with the way human song may have created the flexibility, timing and vocal learning required for language and speech. The implications of our research are discussed in relation to a potential song-based, proto-language used by our human ancestors.

## References

- Clarke, E., Reichard U.H., & Zuberbühler K (2006). The Syntax and Meaning of Wild Gibbon Songs. *PLoS ONE* 1(1): e73.
- Clarke, E. (2010). The Vocalisations and Anti-predatory Behaviour of Wild White-handed Gibbons (*Hylobates lar*) in Khao Yai National Park, Thailand. PhD Thesis.
- Darwin, C. (1871). *Descent of man*. London: Murray.
- Fitch, W Tecumseh. (2006). The biology and evolution of music: A comparative perspective. *Cognition*, 100: 173-215.
- Janik, V. & Slater, P. J. B. (1997). Vocal learning in Mammals. *Advances in the Study of Behavior*. 26, 59-99.
- Jespersen, Otto. (1922). *Language: Its Nature, Development and Origin*. New York: W. W. Norton & Co.
- McComb, K. and Semple, S. (2005). Co-evolution of vocal communication and sociality in primates. *Biology Letters*, 1 (4), 381-385.
- Vaneechoutte, M. and Skoyles, J. R. (1998). The memetic origin of language: modern humans as musical primates. *Journal of Memetics - Evolutionary Models of Information Transmission* 2(2).  
[http://cfpm.org/jom-emit/1998/vol2/vaneechoutte\\_m&skoyles\\_jr.html](http://cfpm.org/jom-emit/1998/vol2/vaneechoutte_m&skoyles_jr.html)