

# Vocal Interactivity in Crowds, Flocks and Swarms: Implications for Voice User Interfaces

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## ABSTRACT

Recent years have seen an explosion in the availability of Voice User Interfaces. However, user surveys suggest that there are issues with respect to usability, and it has been hypothesised that contemporary voice-enabled systems are missing crucial behaviours relating to user engagement and vocal interactivity. However, it is well established that such *ostensive* behaviours are ubiquitous in the animal kingdom, and that vocalisation provides a means through which interaction may be coordinated and managed between individuals and within groups. Hence, this paper reports results from a study aimed at identifying generic mechanisms that might underpin coordinated collective vocal behaviour with a particular focus on closed-loop negative-feedback control as a powerful regulatory process. A computer-based real-time simulation of vocal interactivity is described which has provided a number of insights, including the enumeration of a number of key control variables that may be worthy of further investigation.

The full pre-print is available at <http://export.arxiv.org/abs/1907.11656>.