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Numerical assessment and individual call discrimination by wild spotted hyaenas, *Crocuta crocuta*

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Game theory predicts that individuals should assess numbers of potential opponents before engaging in aggressive interactions, particularly when numerical odds can determine outcomes of such interactions. Spotted hyaenas, *Crocuta crocuta*, live in fission–fusion societies in which extreme numerical imbalances can occur during intergroup conflicts, which are potentially lethal. Thus, an ability to assess relative numbers of opponents should be highly advantageous in this species. Here we tested abilities of wild spotted hyaenas to assess numerical advantage with a playback experiment by presenting contact calls produced by one, two or three unknown hyaenas, or “intruders”™, to individuals in our study clans. Hyaenas conformed to predictions of game theory by increasing vigilance to playbacks of multiple unfamiliar intruders. Furthermore, hyaenas distinguished not just between calls produced by one versus multiple intruders, but showed a fine-grained ability to assess numerical advantage, and they responded with increasing levels of vigilance to calls produced by one, two and

they responded with increasing levels of vigilance to calls produced by one, two and three unknown intruders. Hyaenas also took more risks by approaching the speaker when they outnumbered calling intruders. Lastly, this study provides experimental evidence that spotted hyaenas can use contact calls to distinguish among individuals.

Highlights

• Wild spotted hyaenas assess numerical advantage when played calls of intruders. • Hyaenas follow predictions of game theory and respond based on numerical odds. • Hyaenas are more cautious when they are outnumbered. • Hyaenas take more risks when they have the numerical advantage. • Hyaenas distinguish among individual conspecifics based on their vocalizations.



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Keywords

Crocuta crocuta; individual discrimination; numerical assessment; numerical cognition; spotted hyaena

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