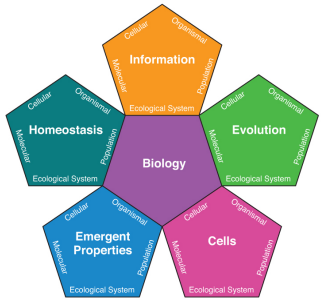
Integrating Concepts in Biology



Chapter 17:
Behavior and Information Exchange

Section 17.3: Does group living require more derived mechanisms of information transfer?

by A. Malcolm Campbell, Laurie J. Heyer, & Christopher Paradise

Section 17.3: Does group living require more derived mechanisms of information transfer?

Biology Learning Objective

- Explain how communication is used by animals that live in groups.
- Demonstrate how the comparative approach is used to understand the evolution of sociality in animals.

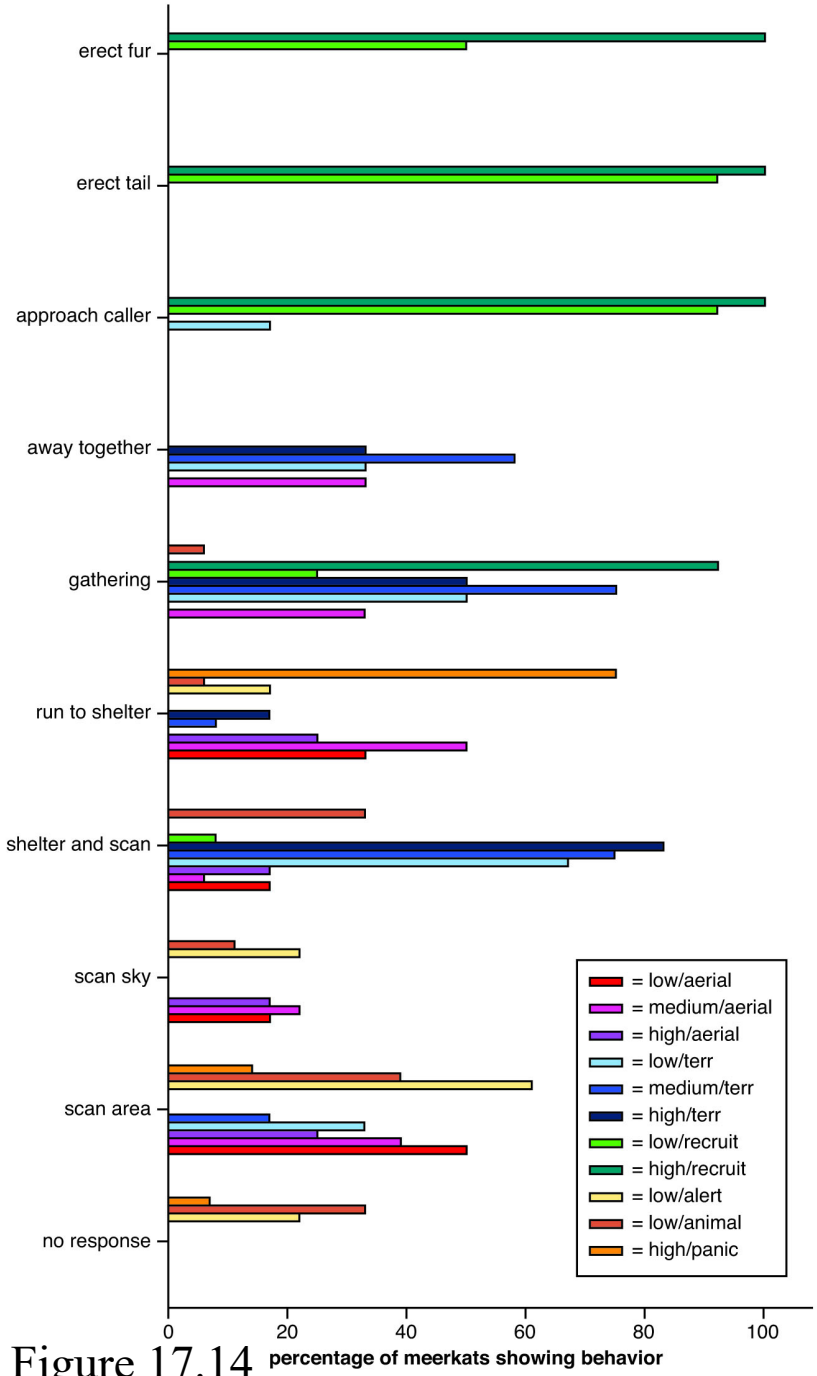


Figure 17.14

Which is a conclusion you can draw from Figure 17.14?

a. Low & High recruitment calls lead to very different responses of meerkats
b. Level of urgency lead to more similarities in behavior than type of threat (Ariel vs Terrestrial)
c. There is no loss of info among meerkats
d. Terrestrial threats lead to particular vocalizations that led to most meerkats gathering, running to shelter and scanning
e. Aerial threats led to particular vocalizations.

Modified from Manser, 2001, Table 2

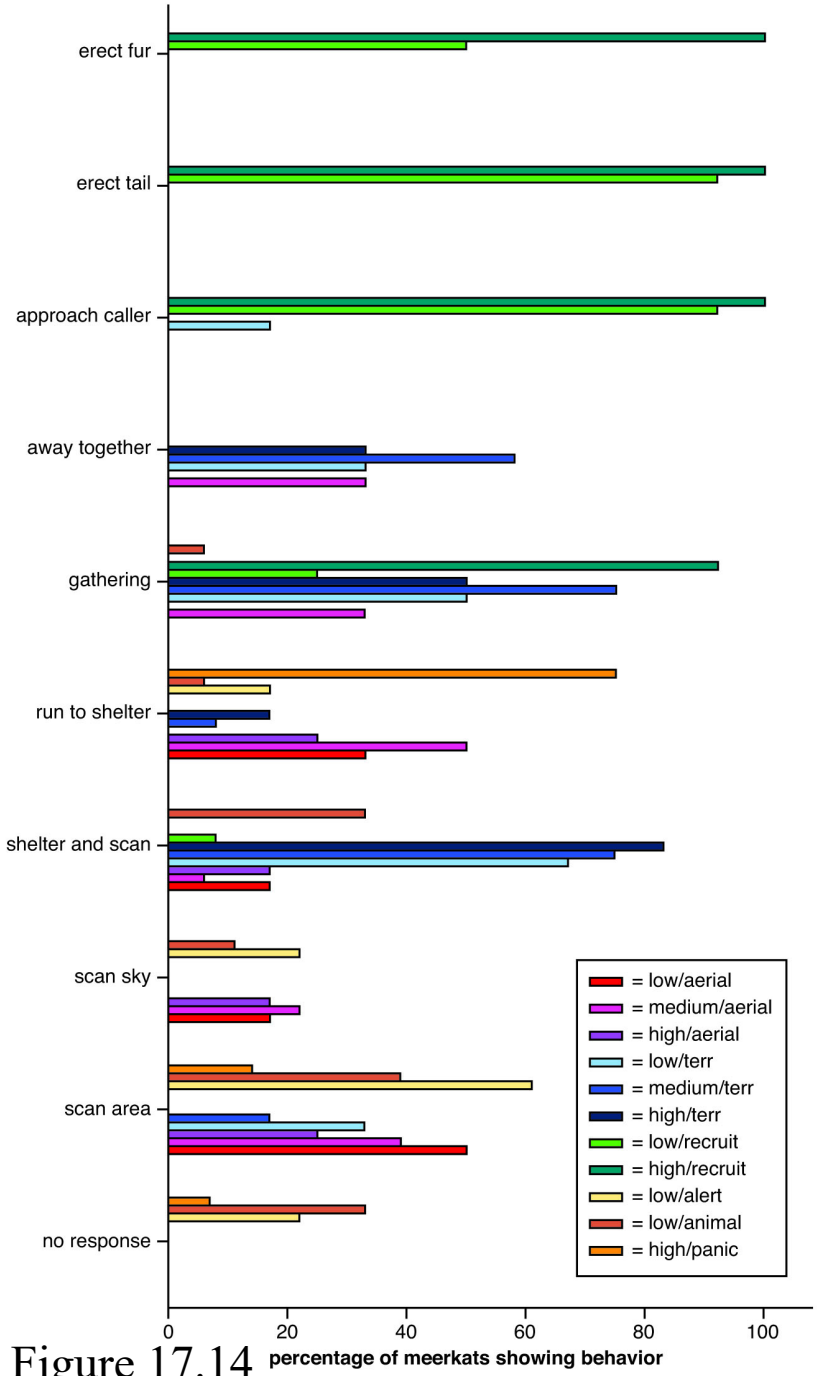


Figure 17.14

Percentages of meerkats displaying a behavior in response to recorded vocalizations

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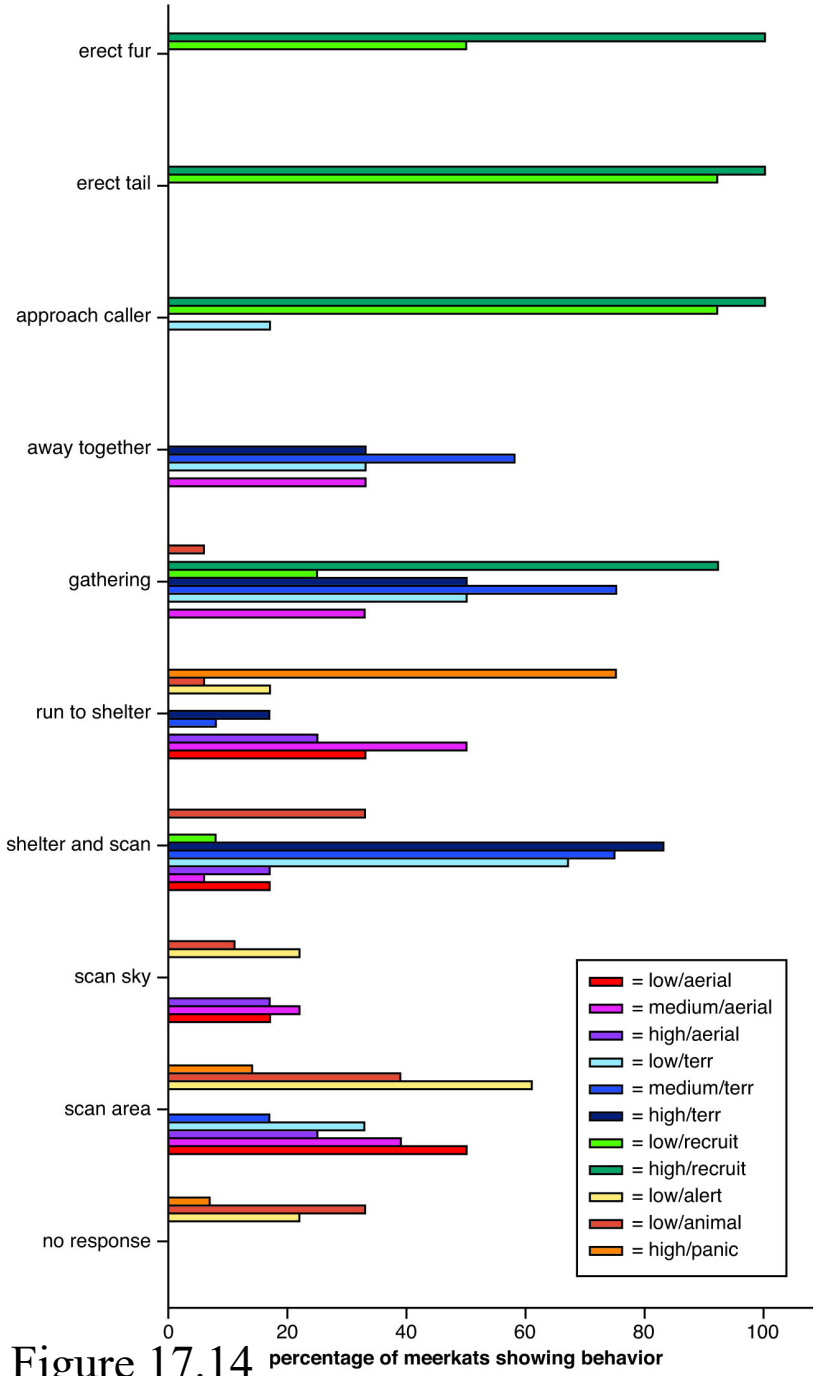

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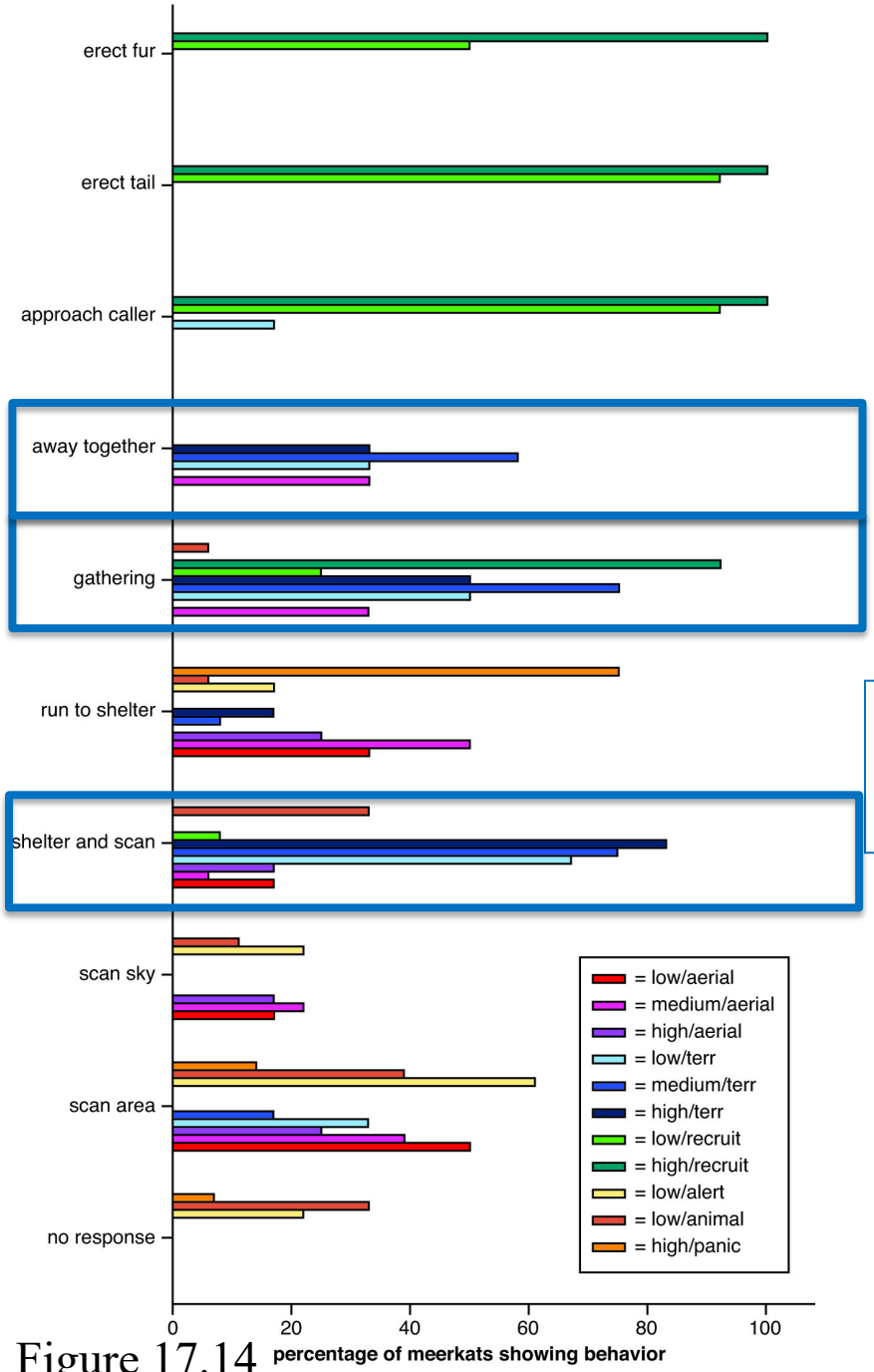

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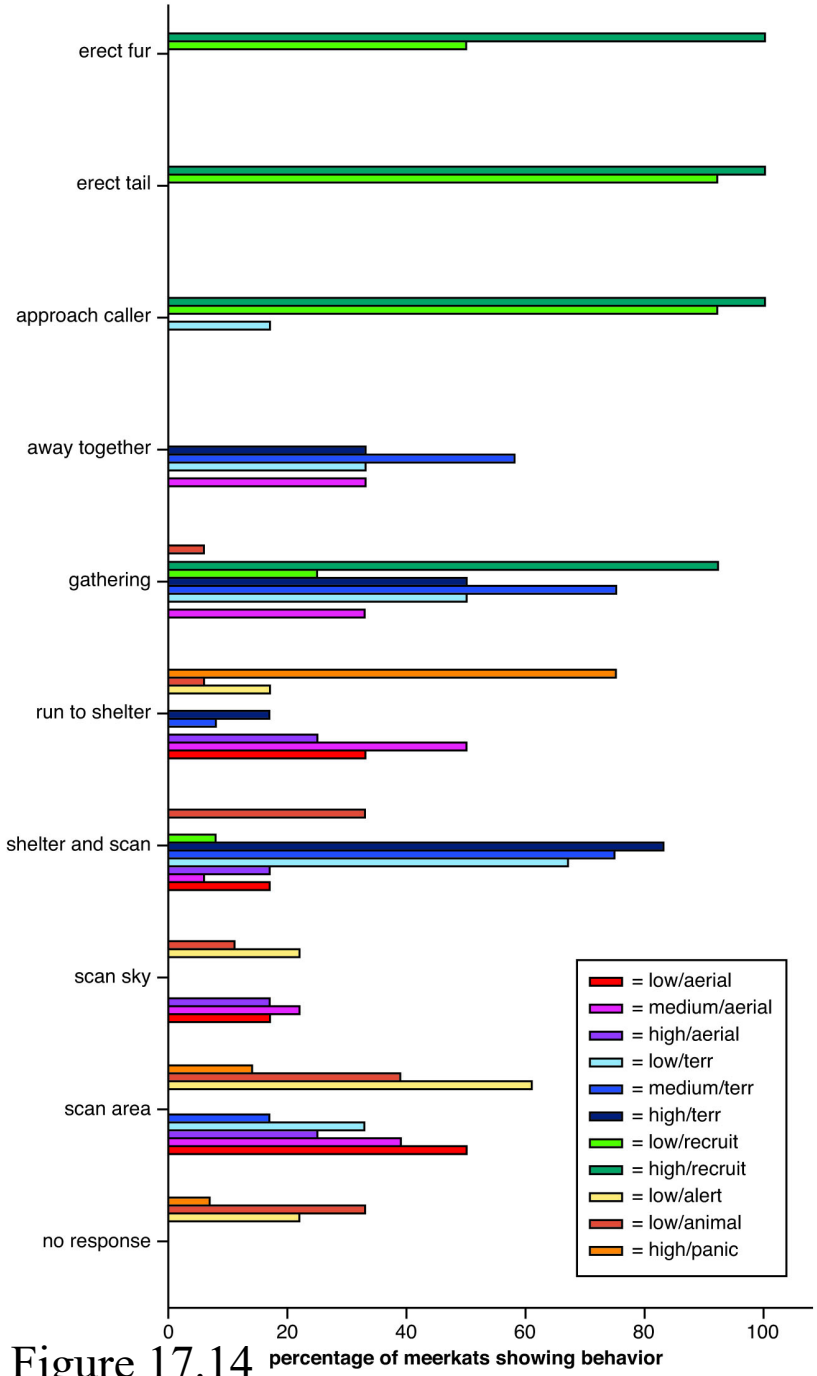

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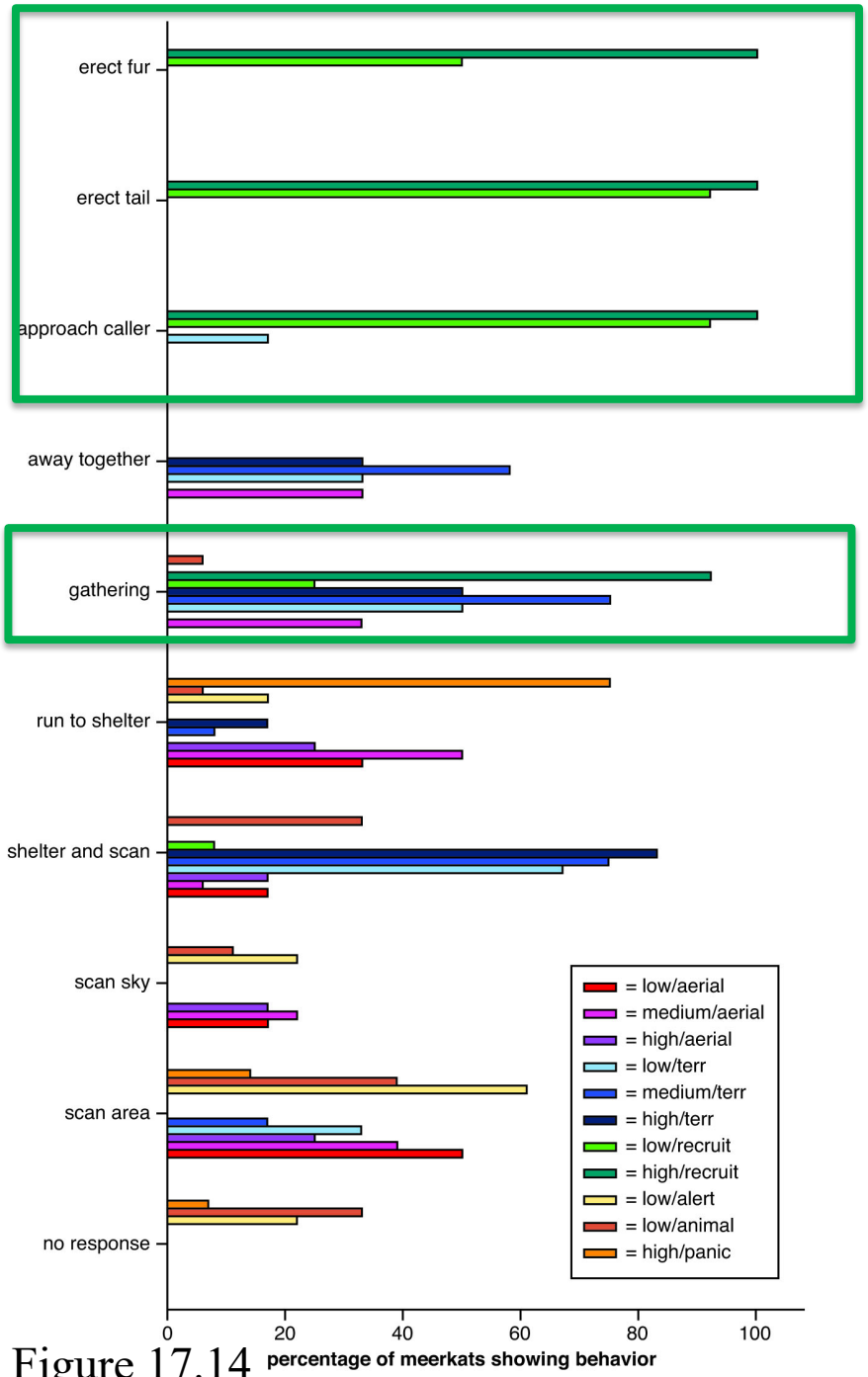


Figure 17.14

Percentages of meerkats displaying a behavior in response to recorded vocalizations

List behaviors associated with recruitment calls (green)?

Modified from Manser, 2001, Table 2

Two species of mongoose, The Cape grey mongoose (*Galerella pulverulenta*) and the meerkat (*Suricata suricata*)

Figure 17.8

The Cape grey mongoose (*Galerella pulverulenta*)

Figure 17.8

Meerkats (*Suricata suricata*)

What are these meerkats doing?

Figure 17.8

A, John Richfield, 2012, Creative Commons. B, Sara&Joachim, Creative Commons

Integrating Questions

- 19. What types of communication would you expect to find in both solitary and social species of mongoose?
- 20. Based on what you know about animal communication so far, design an experiment to determine whether social species of mongoose communicate in ways that solitary species do not. What variables would you want to hold constant in your study?

Figure 17.8

Home ranges of five Cape Gray mongooses

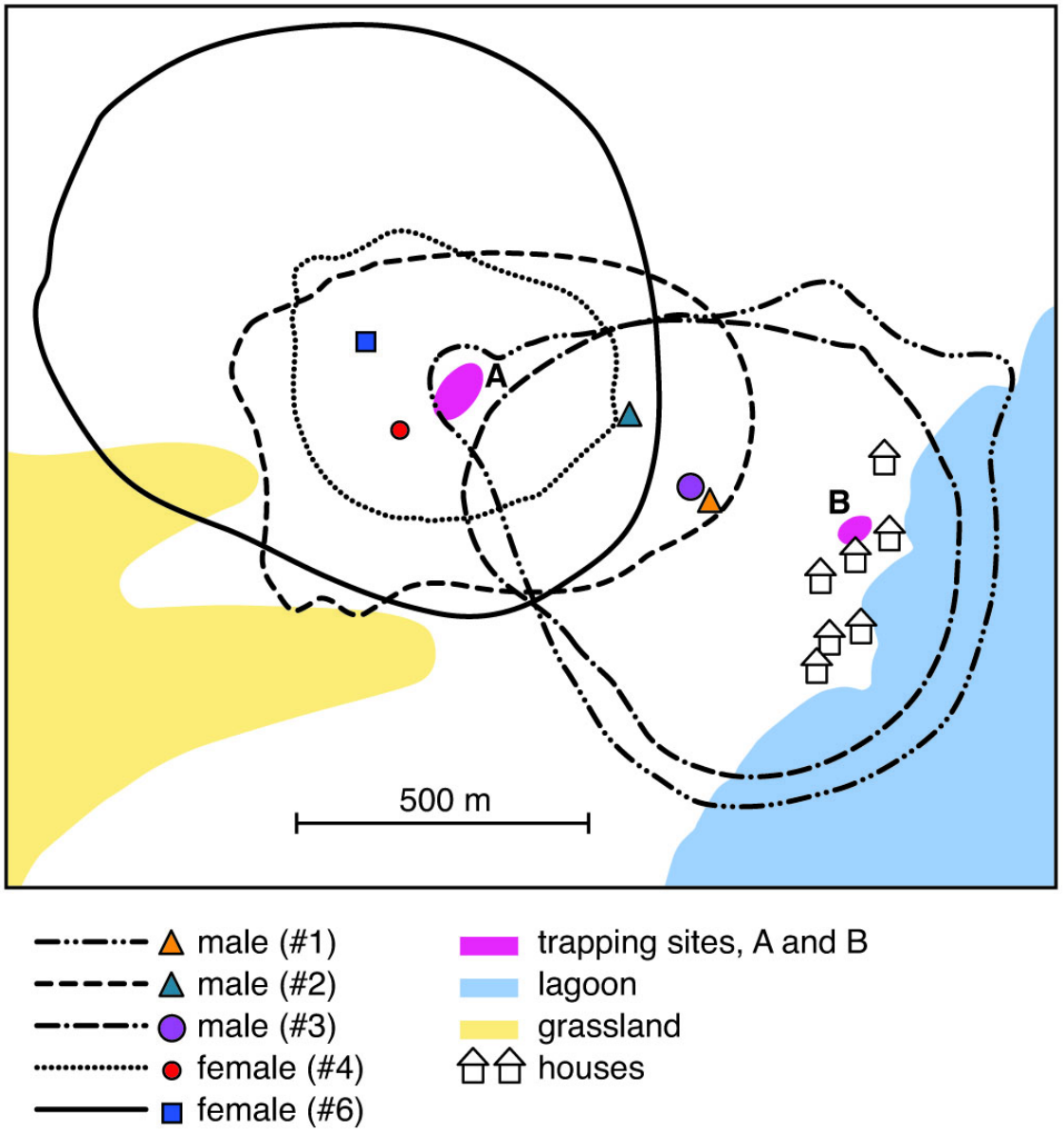


Figure 17.9

Home ranges of five Cape Gray mongooses

Two home ranges are highlighted – what do you conclude about home ranges of the Cape Gray mongoose?

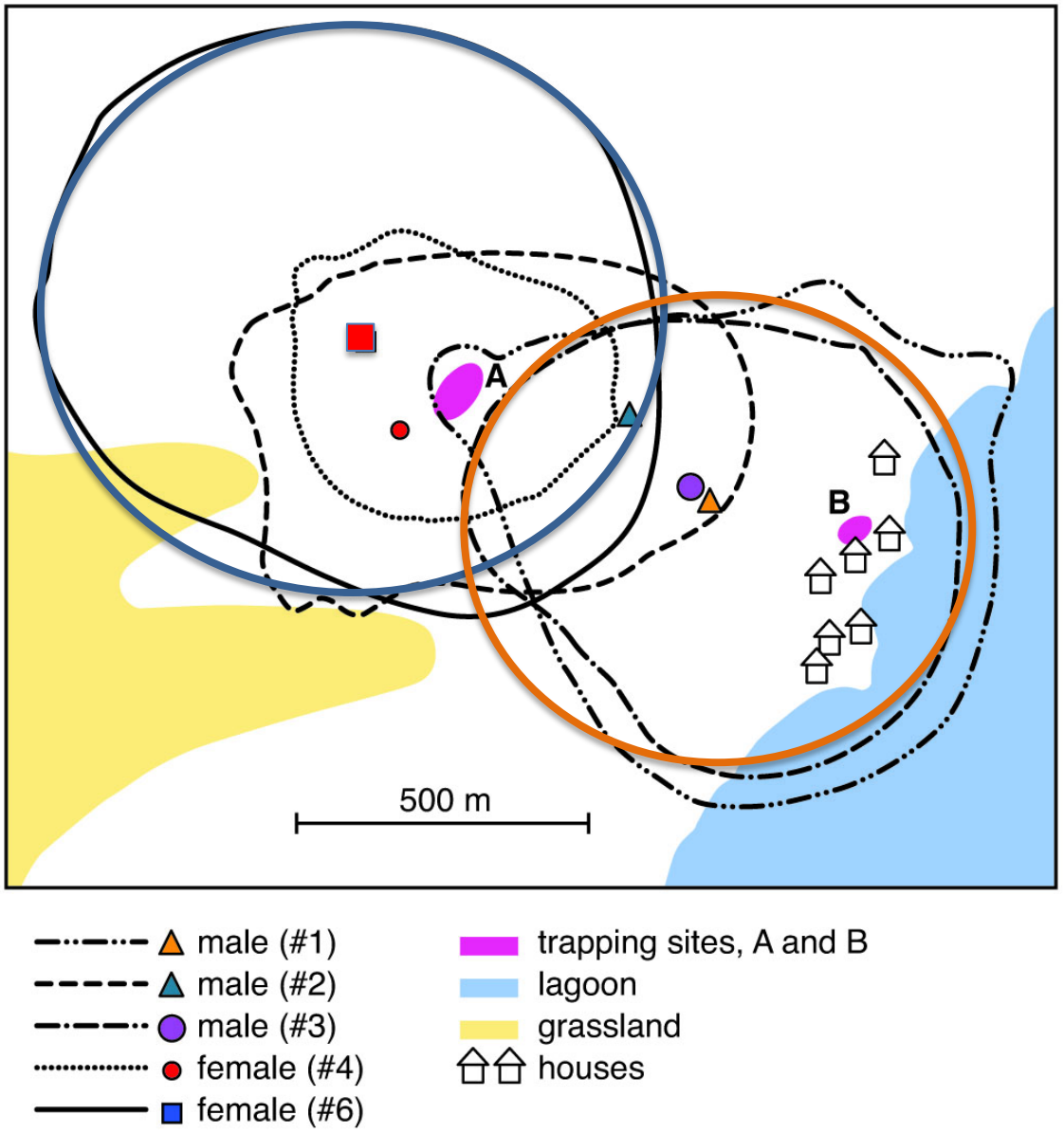


Figure 17.9

What do we know about mongoose vocalizations and behavior?

- Diurnal
- Describe their habitat.
- Mostly solitary; when are they not?
- Do they vocalize? Where are the data?
- What are functions of vocalizations in solitary animals?

http://www.youtube.com/watch?NR=1&v=vdg9gkmWsEA&feature=endscreen

http://video.nationalgeographic.com/video/player/animals/bugs-animals/spiders-and-scorpions/meerkat.html

Sonograms of the four most common meerkat sentinel calls

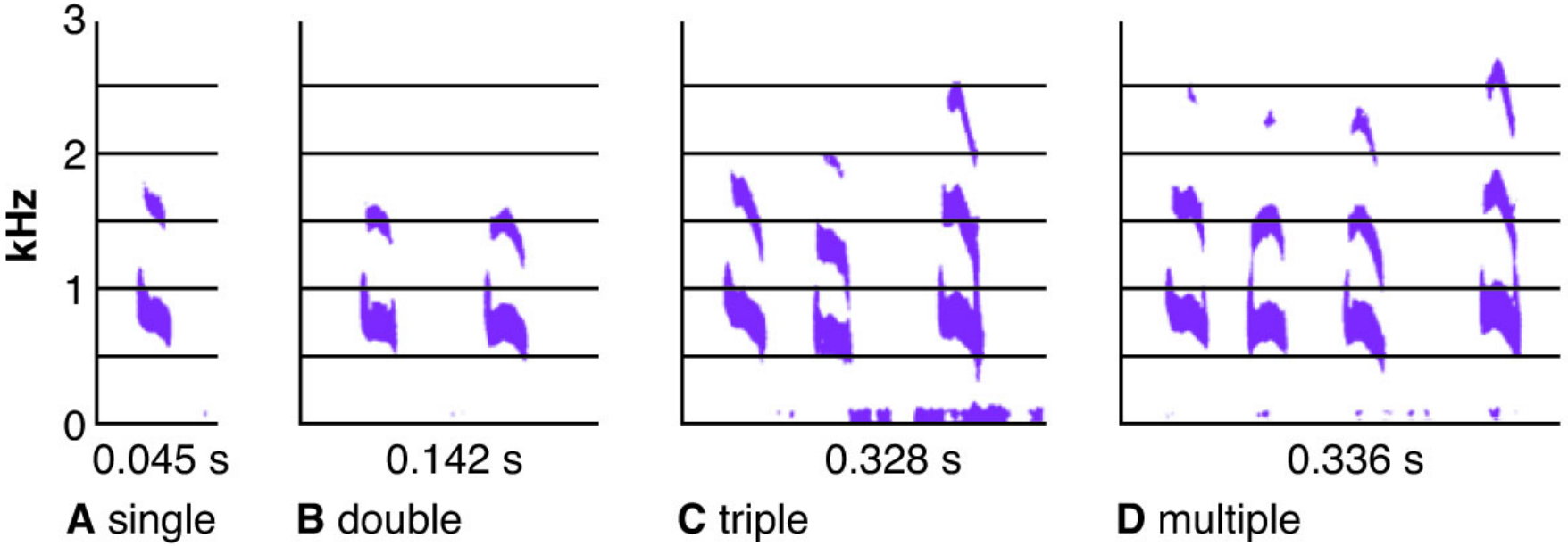
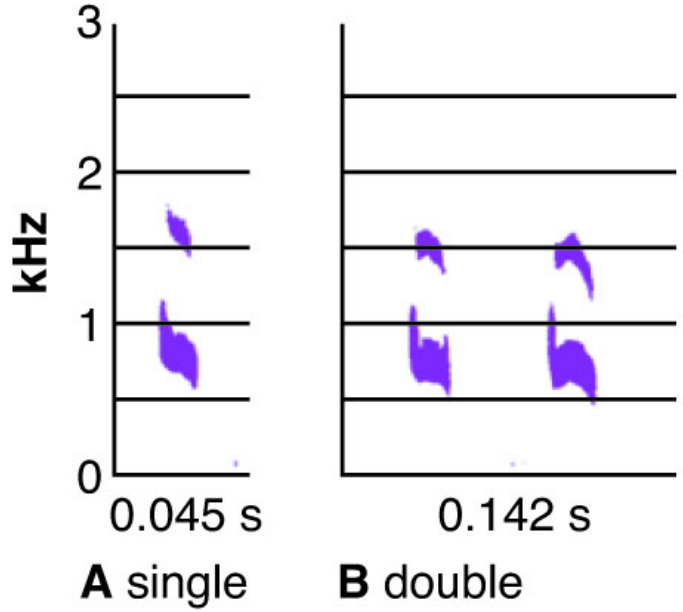


Figure 17.10

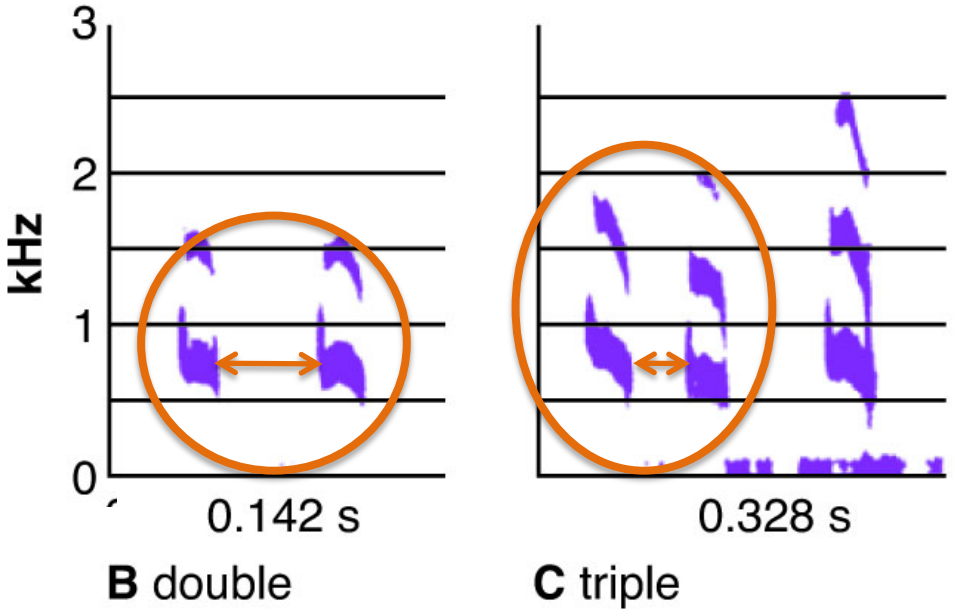
Sonograms of single and double sentinel calls



Are there similarities in the call characteristics?

Figure 17.10

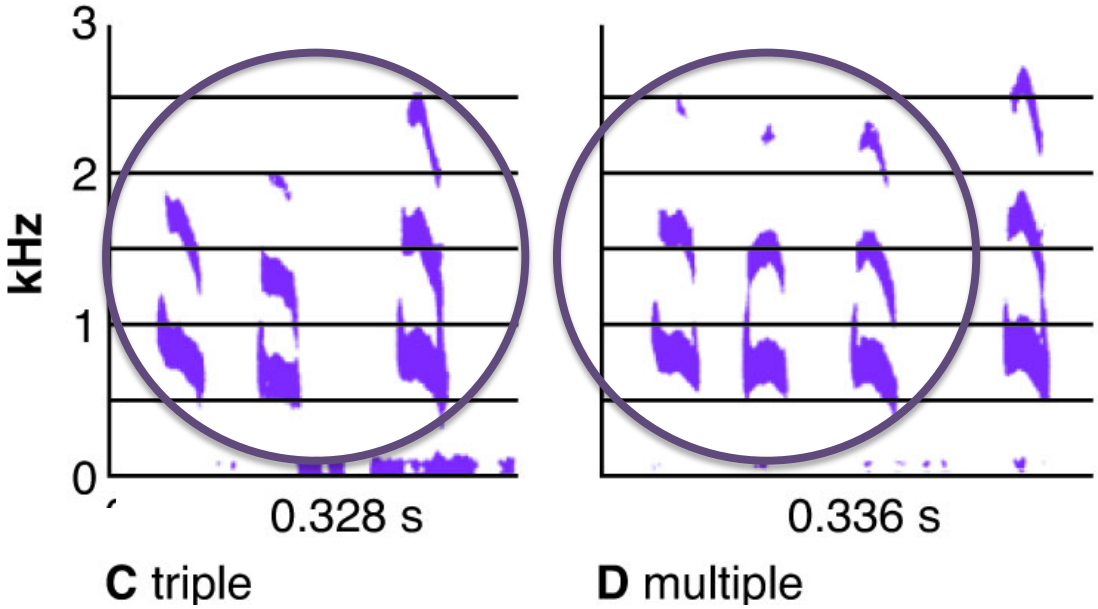
Sonograms of double and triple sentinel calls



Are there similarities in the call characteristics?

Figure 17.10

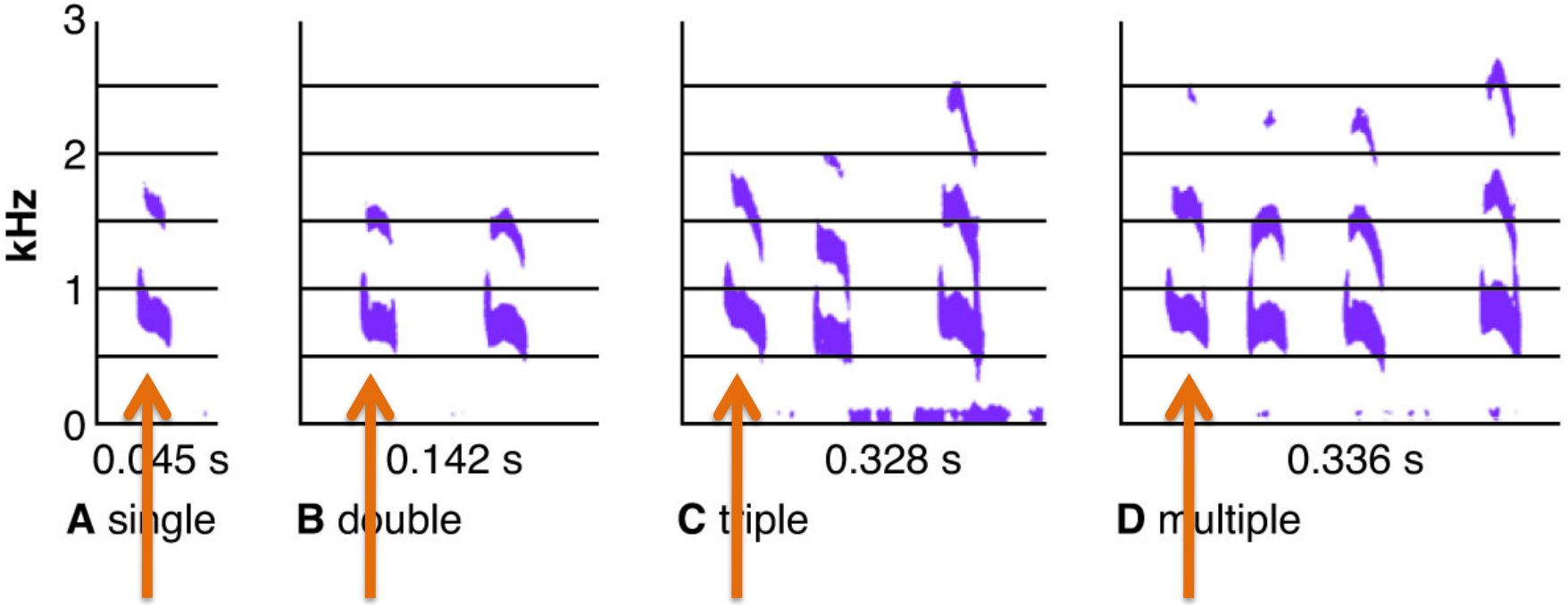
Sonograms of triple and multiple sentinel calls



Are there similarities in the call characteristics?

Figure 17.10

Sonograms of the four most common meerkat sentinel calls



Are there similarities in the call characteristics?
Compare the first syllable of each call.

Figure 17.10

Sonograms of meerkat alarm calls

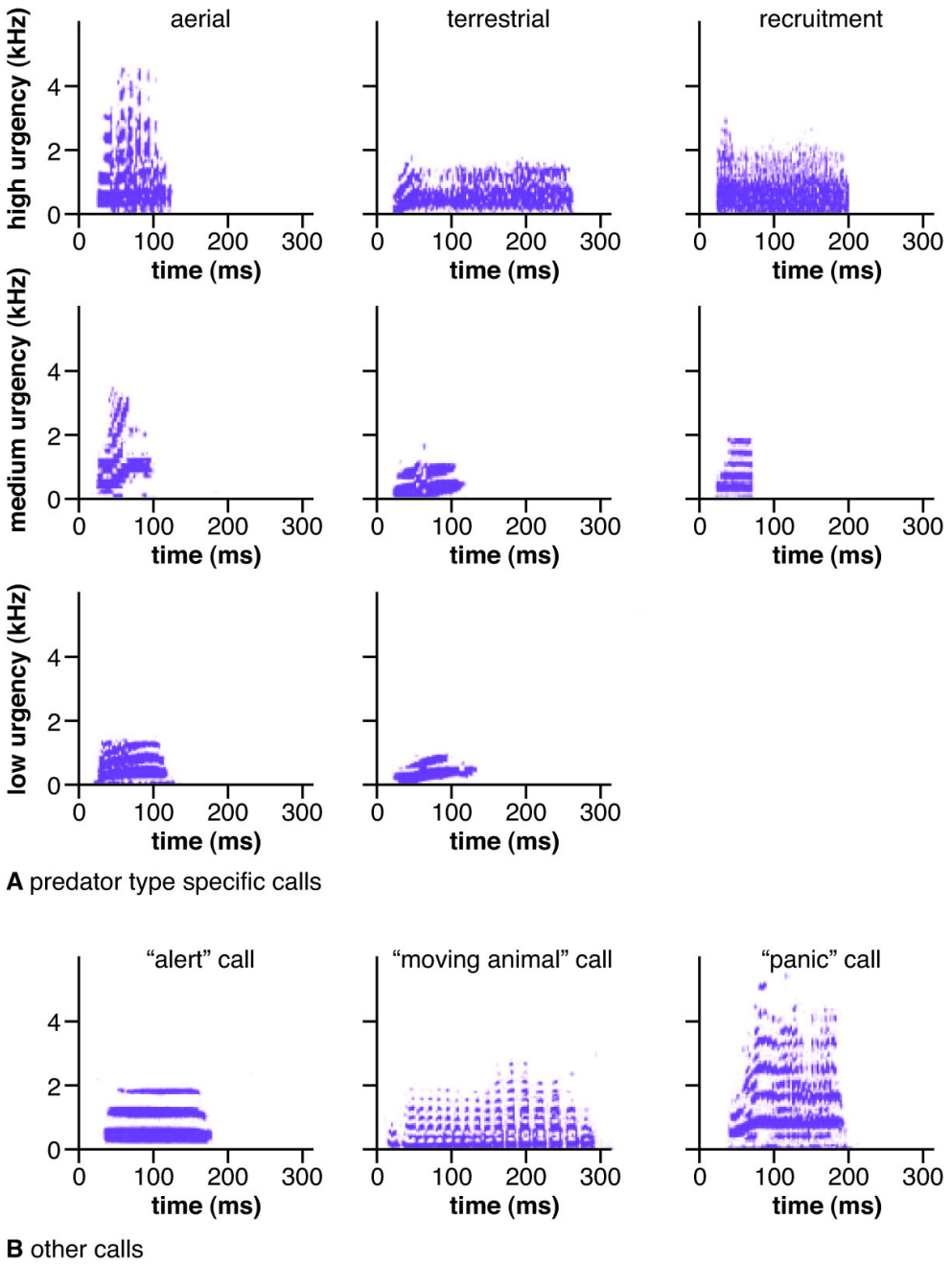
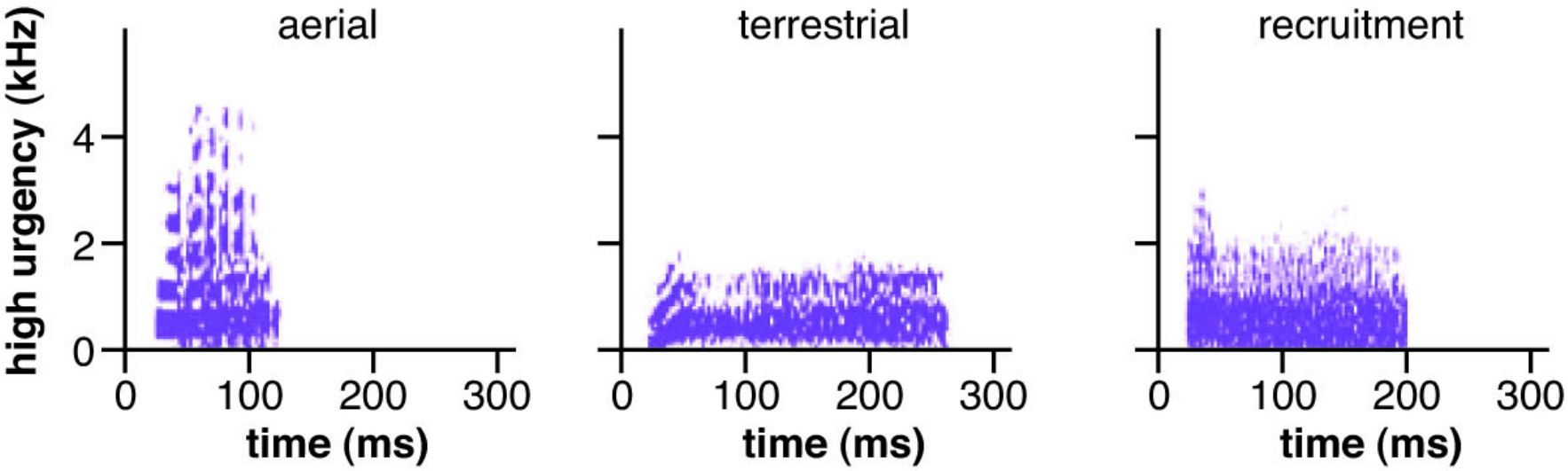


Figure 17.11

Analyze three types of high urgency calls



What differences in high urgency calls do you observe?

Figure 17.11

Analyze three aerial calls of different urgency levels

How do aerial calls of different urgency vary?

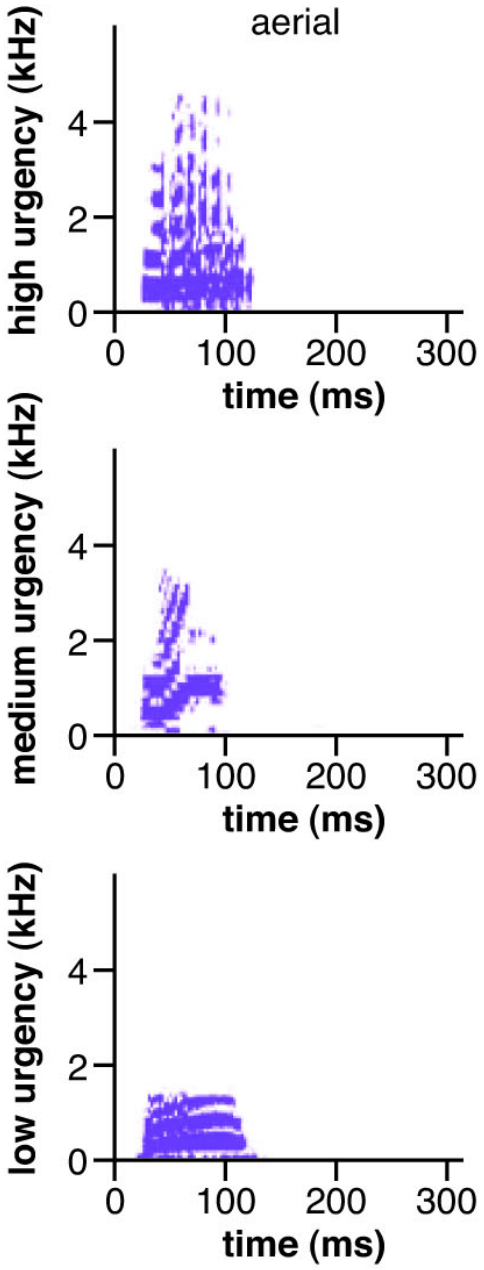


Figure 17.11

Analyze three terrestrial calls of different urgency levels

How do terrestrial calls of different urgency vary?

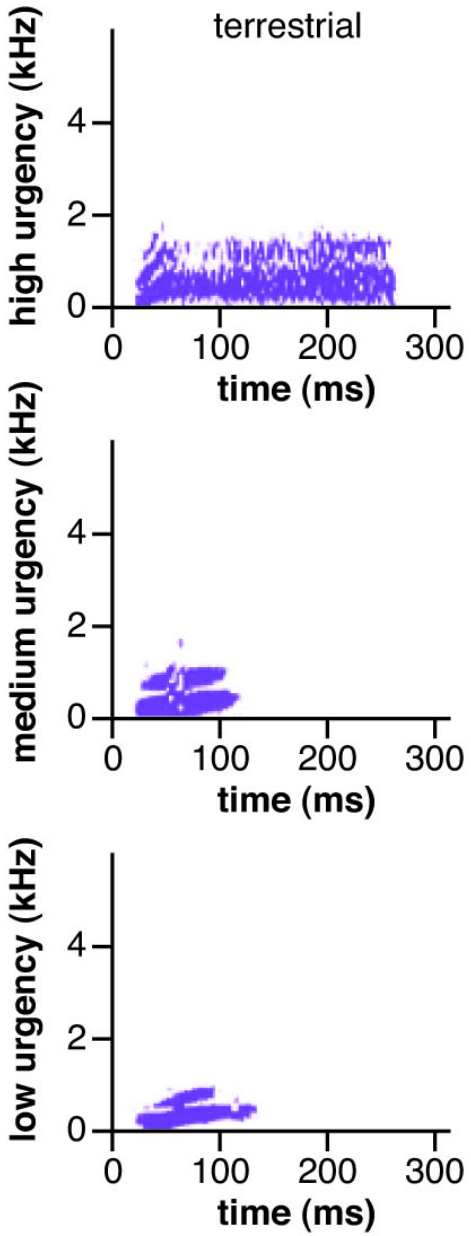
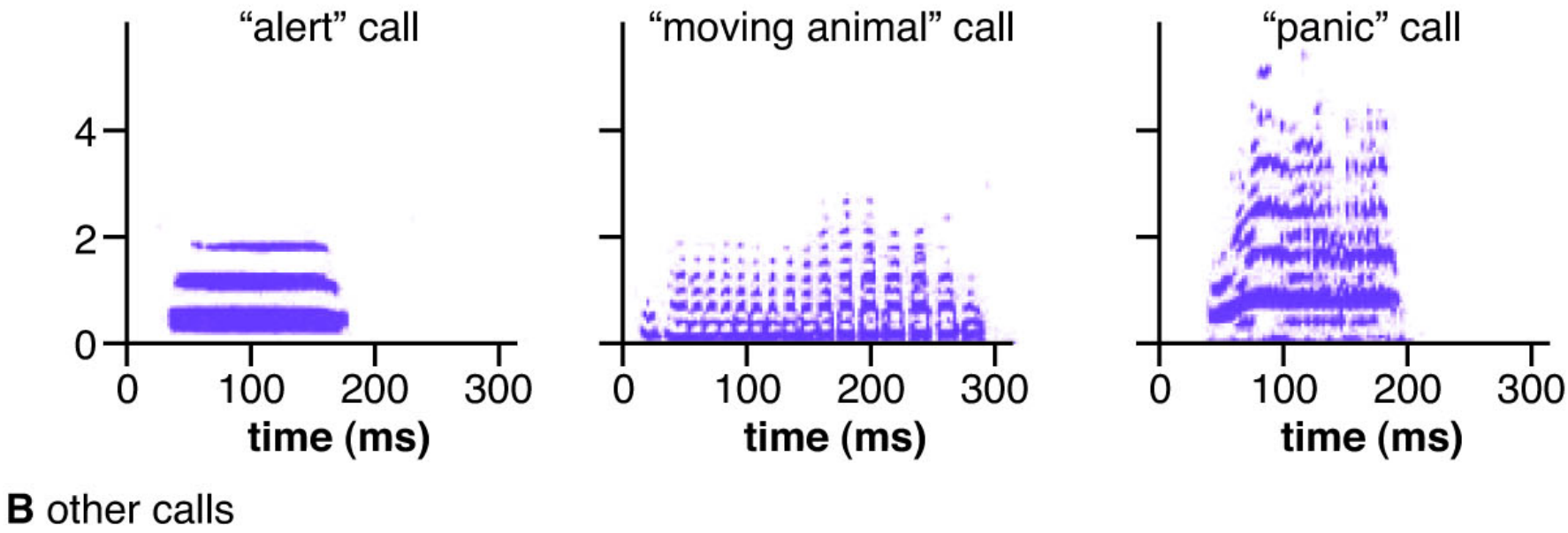


Figure 17.11

Modified from Manser, 1999, Figure 1 by permission of the Royal Society.

Analyze differences among other types of meerkat alarm calls



General panic calls also differ - how?

Figure 17.11

Sonograms of meerkat alarm calls

Compare and contrast them all

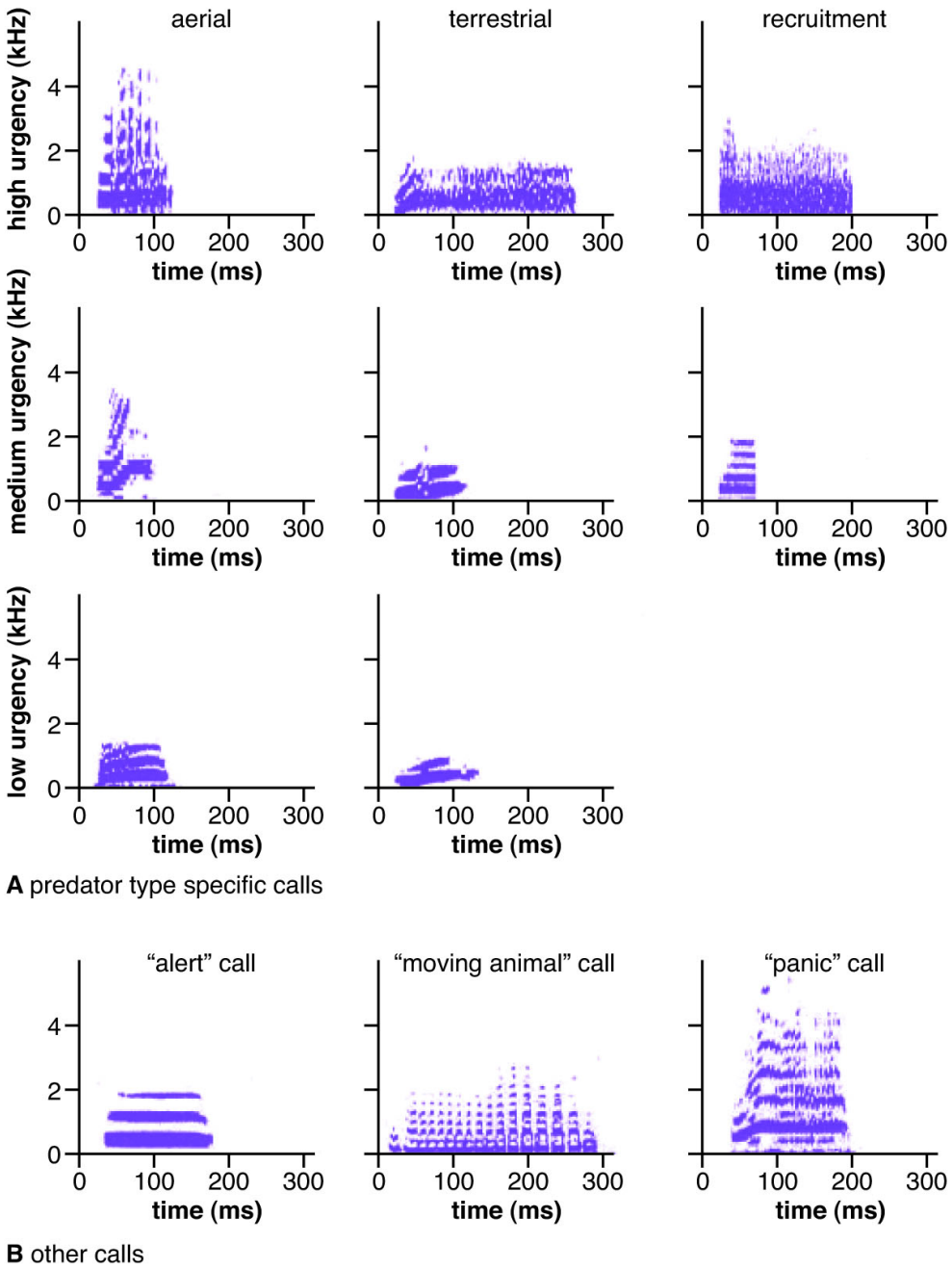


Figure 17.11

Time interval between new meerkat sentinels assuming guard duty under different conditions

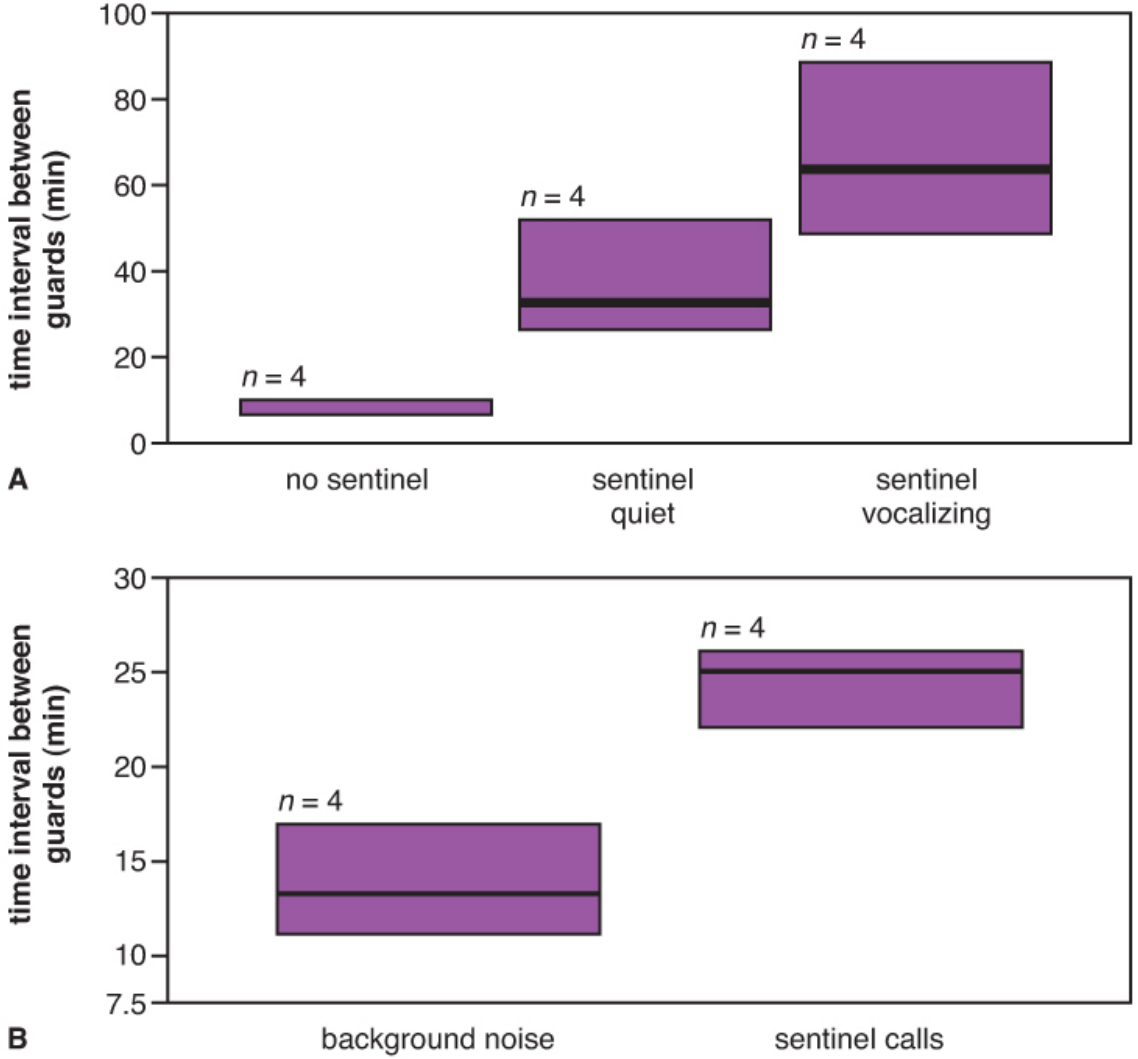
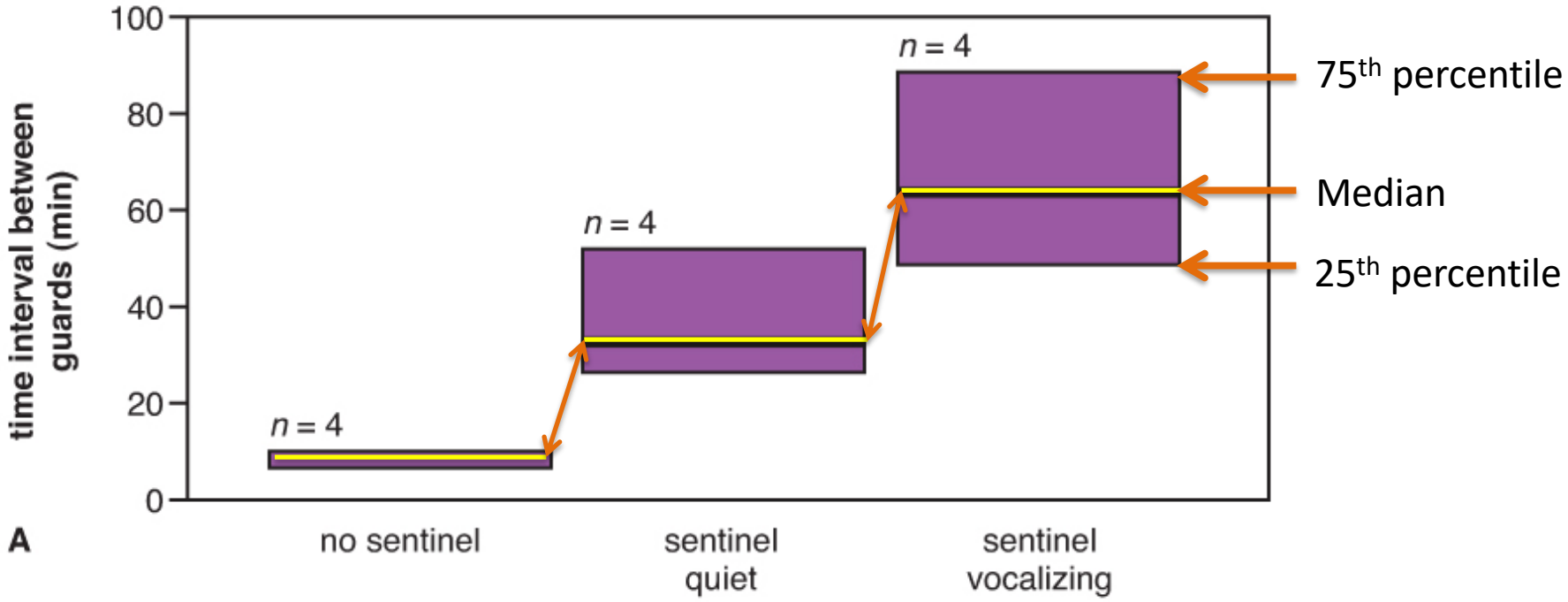


Figure 17.12

Modified from Manser, 1999, Figure 17 by permission of the Royal Society.

Time interval between new meerkat sentinels assuming guard duty



Analyze differences in medians and ranges

Figure 17.12

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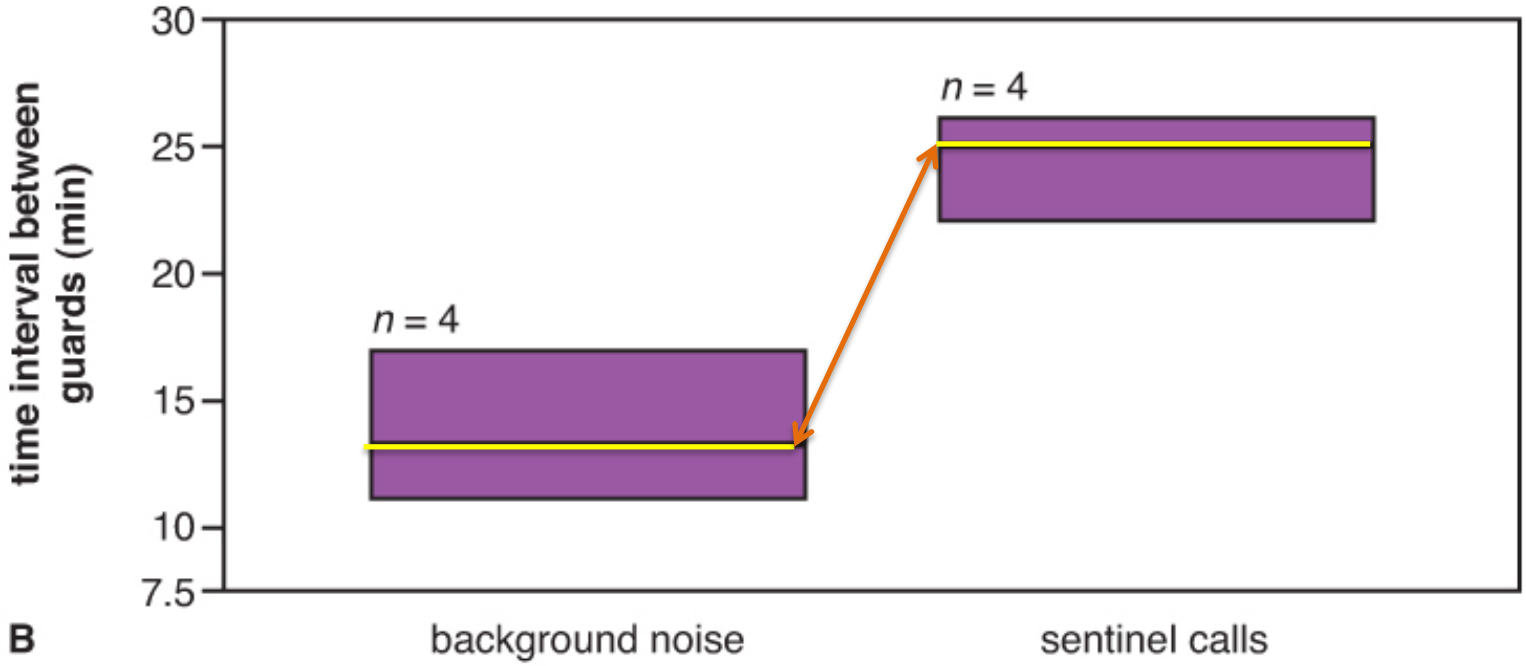
Time interval between new meerkat sentinels assuming guard duty in playback experiment



Analyze differences in medians and ranges

Figure 17.12

Sentinel call playback experiment

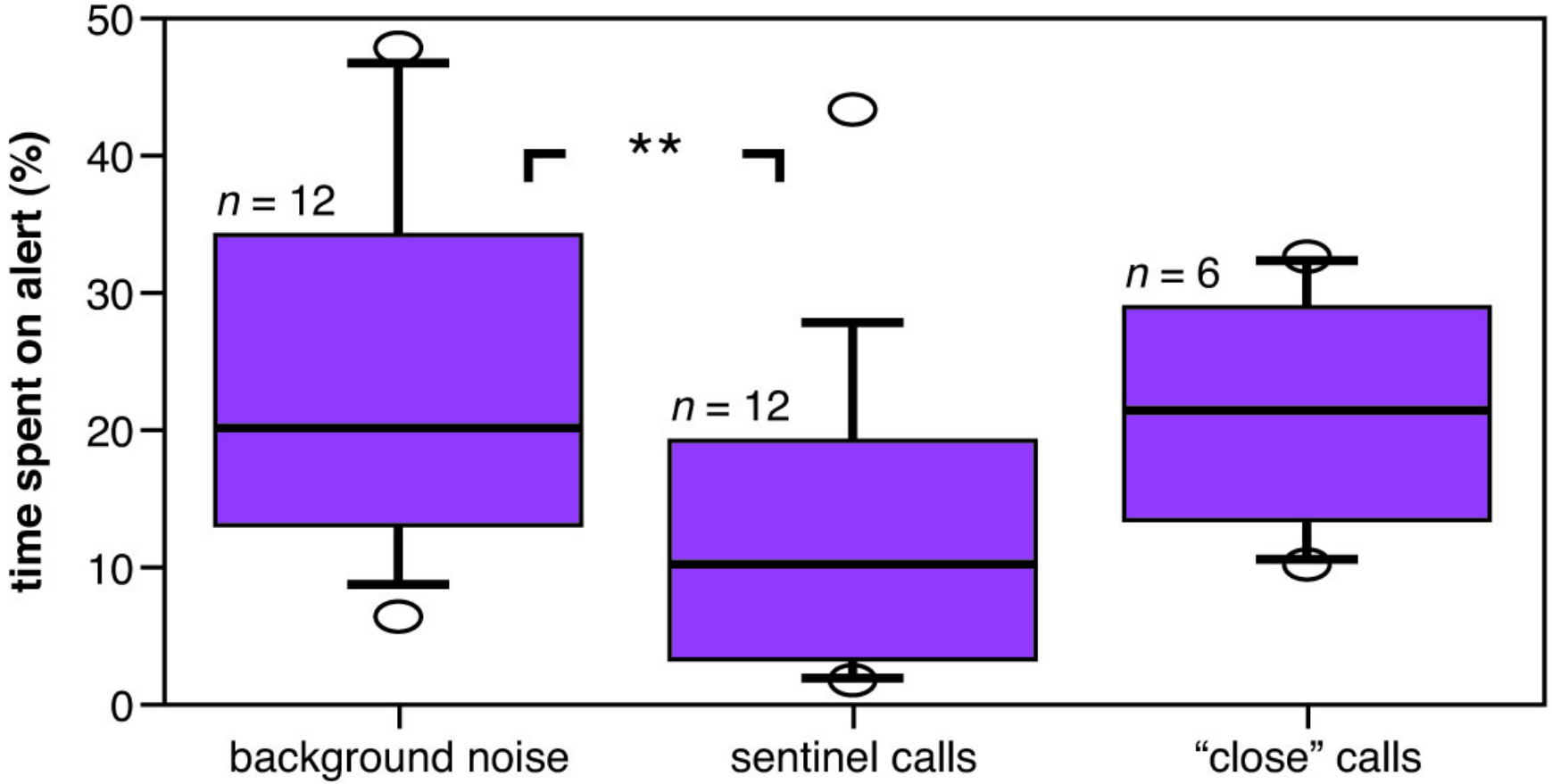
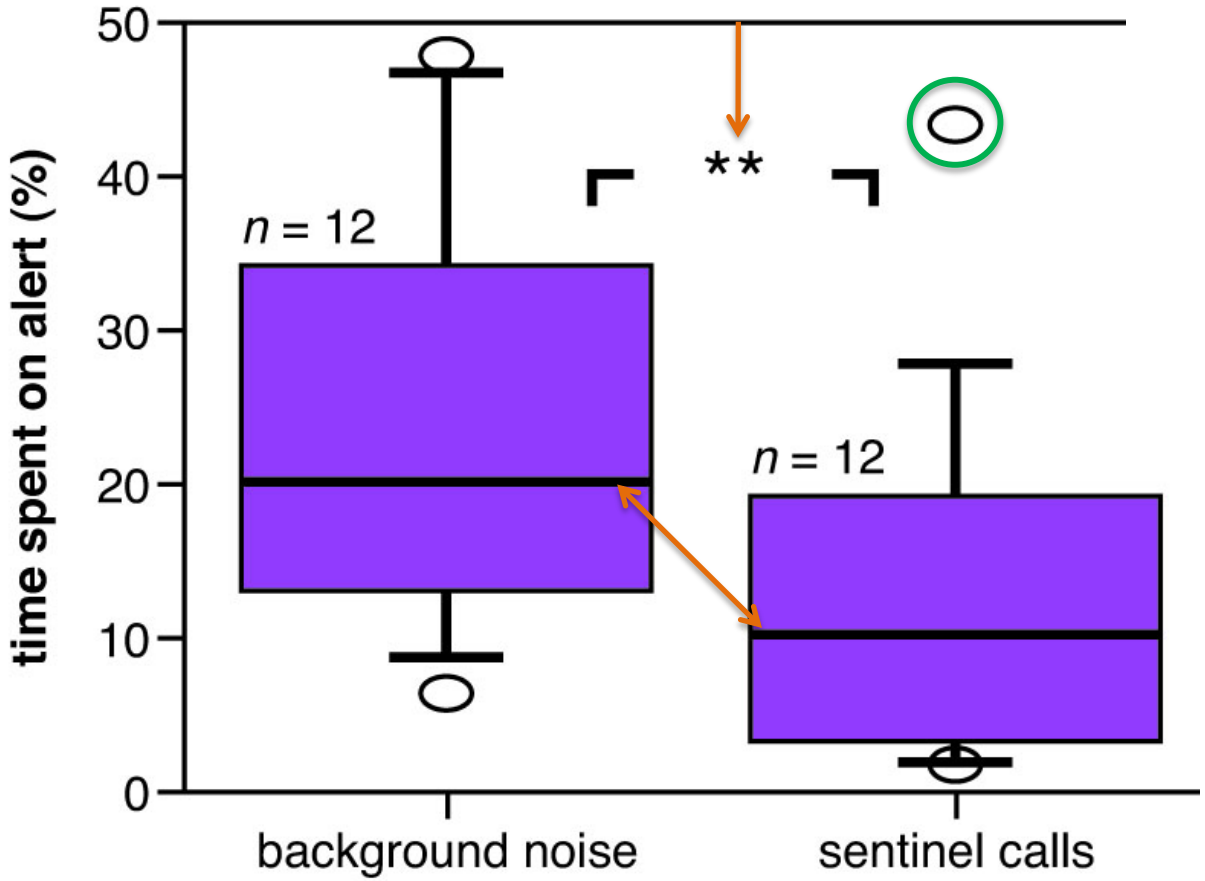


Figure 17.13

Sentinel call playback experiment



What does the circled point represent?

Analyze results of playback experiment

Figure 17.13

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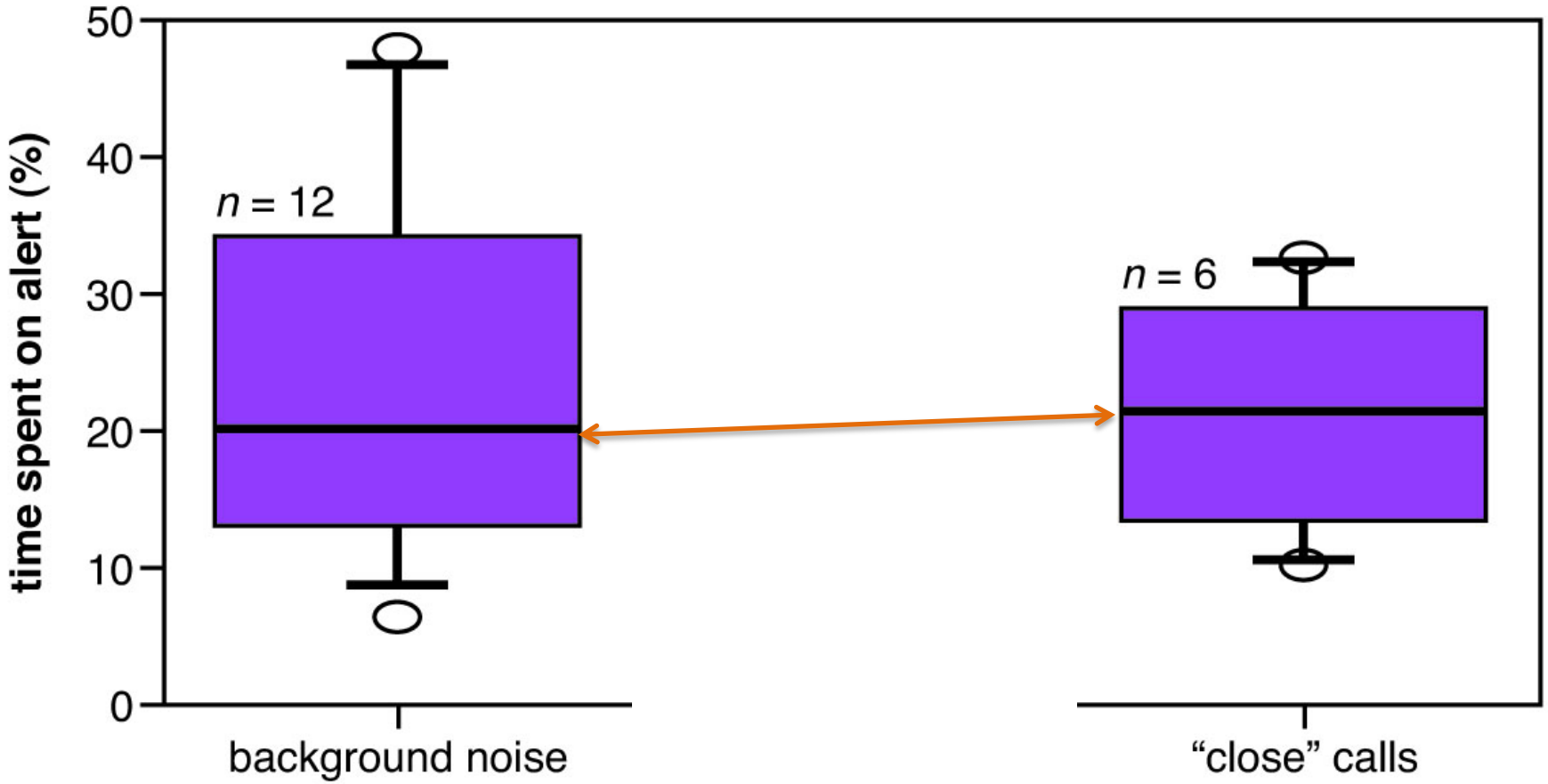
Sentinel call playback experiment



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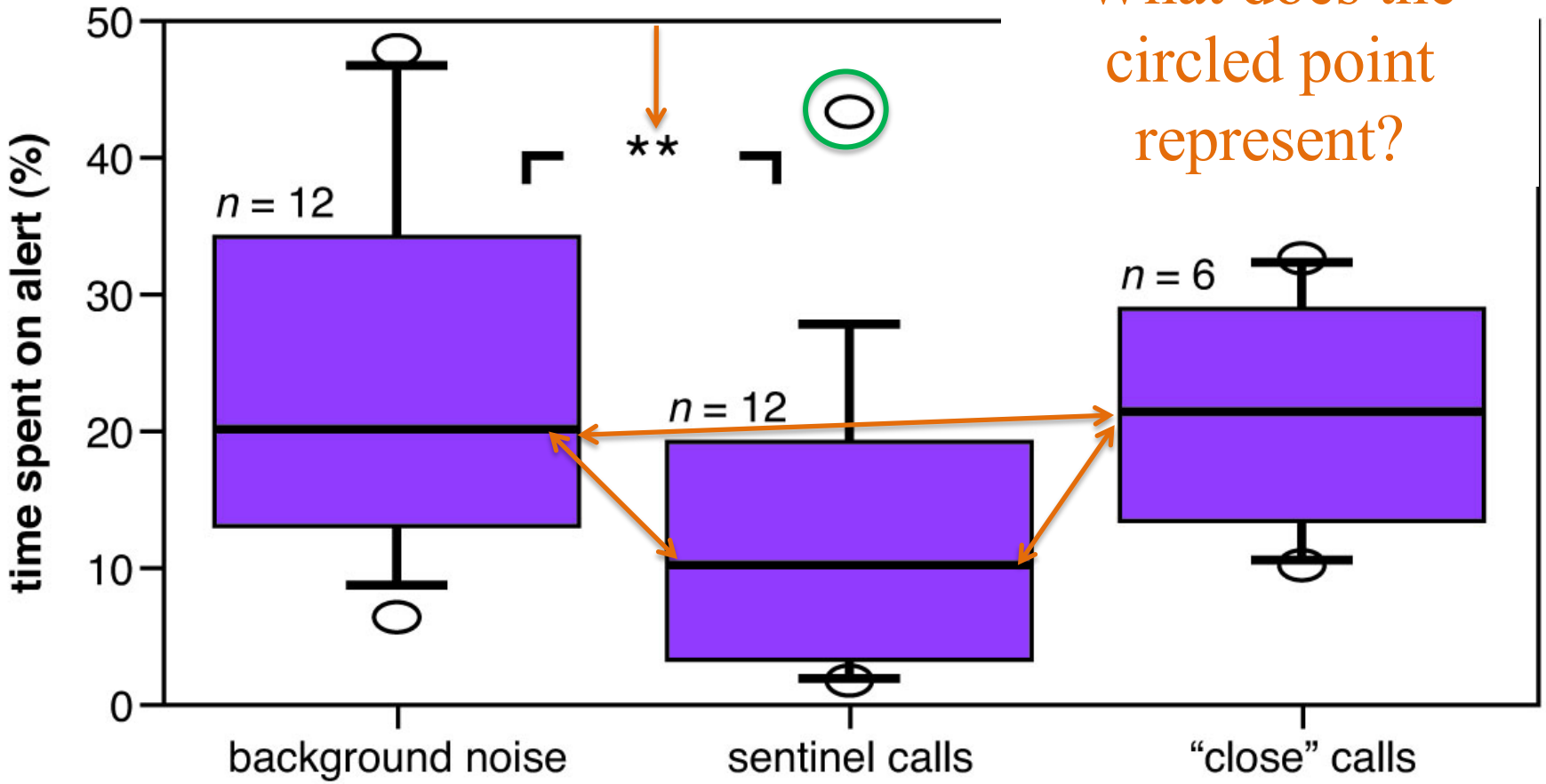

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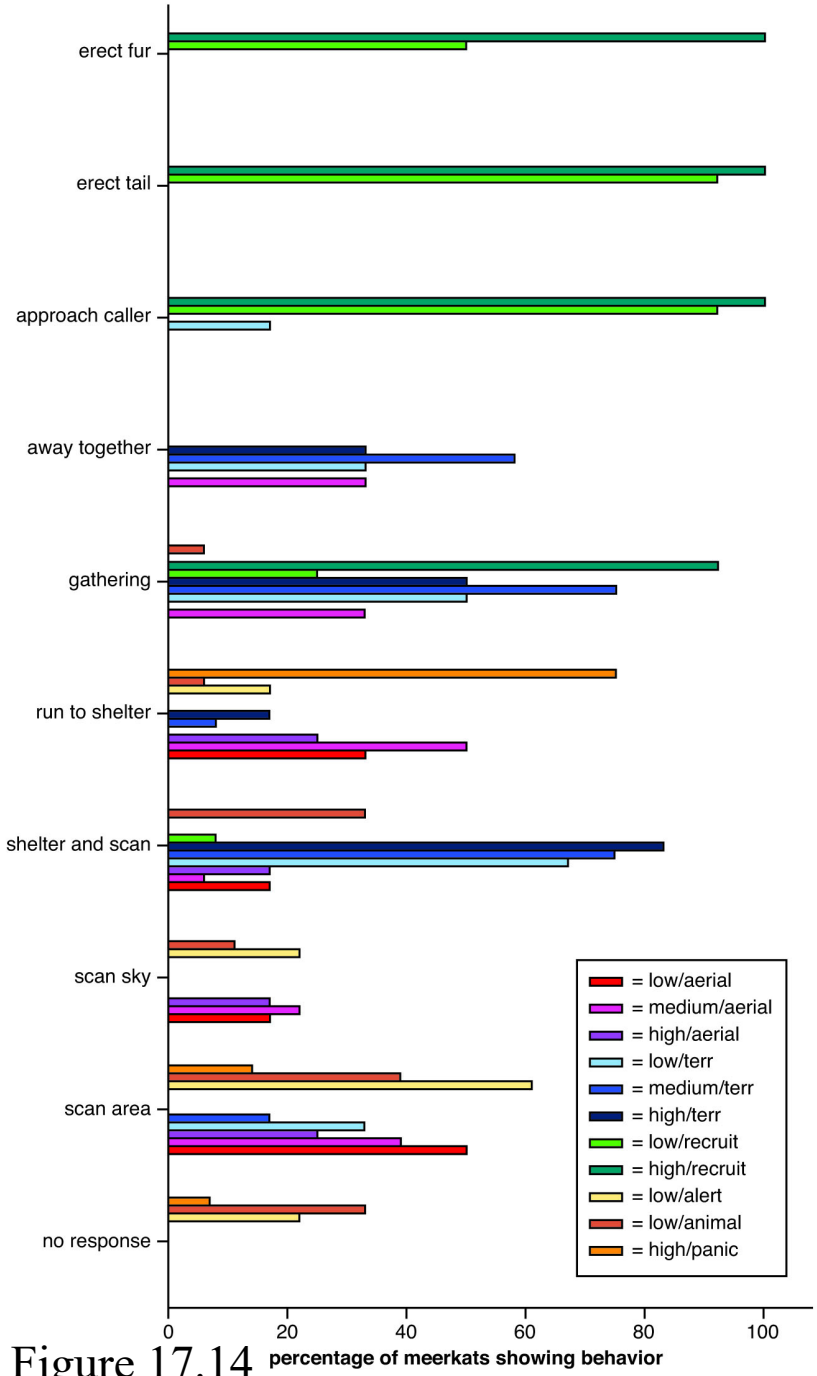
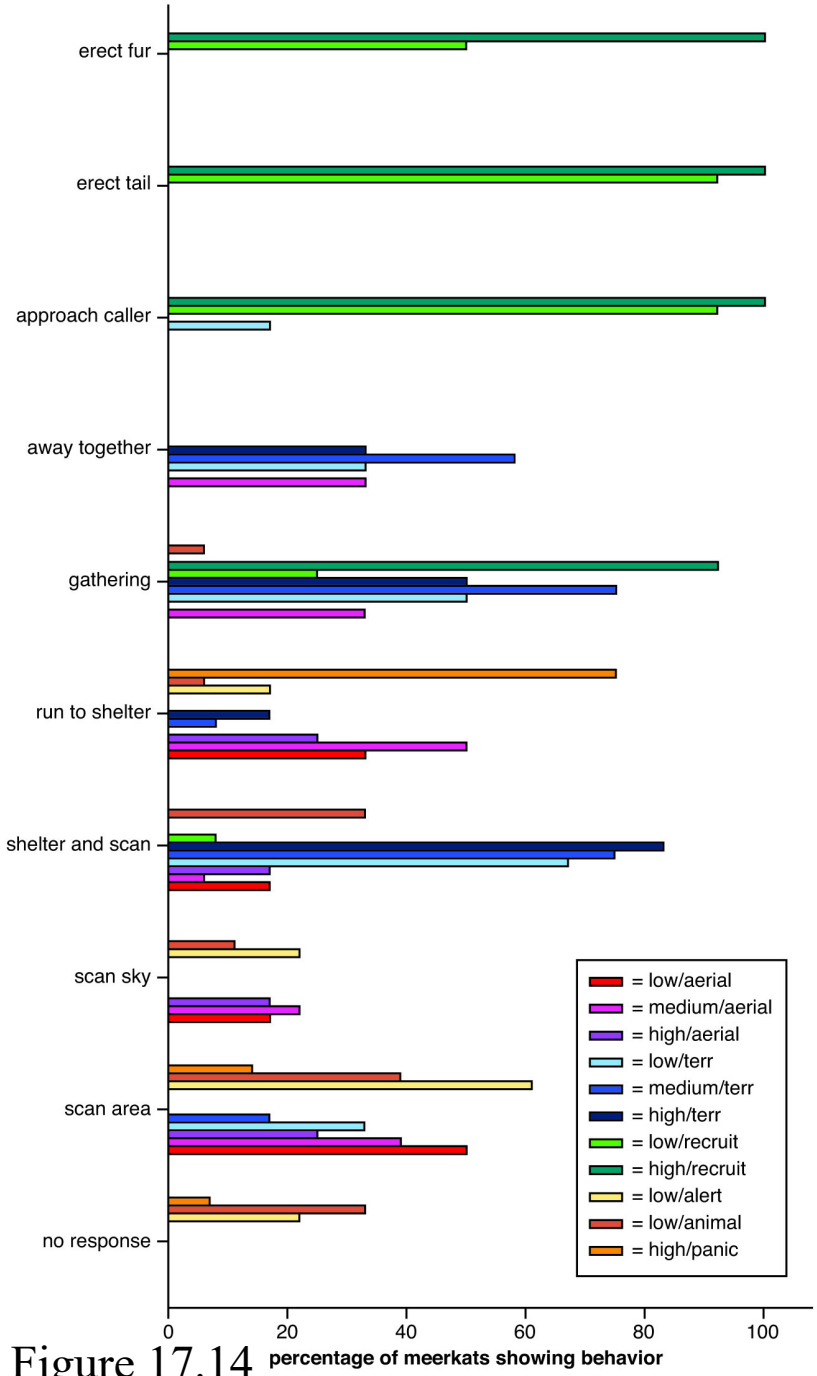


Figure 17.14

Percentages of meerkats displaying a behavior in response to recorded vocalizations

Modified from Manser, 2001, Table 2



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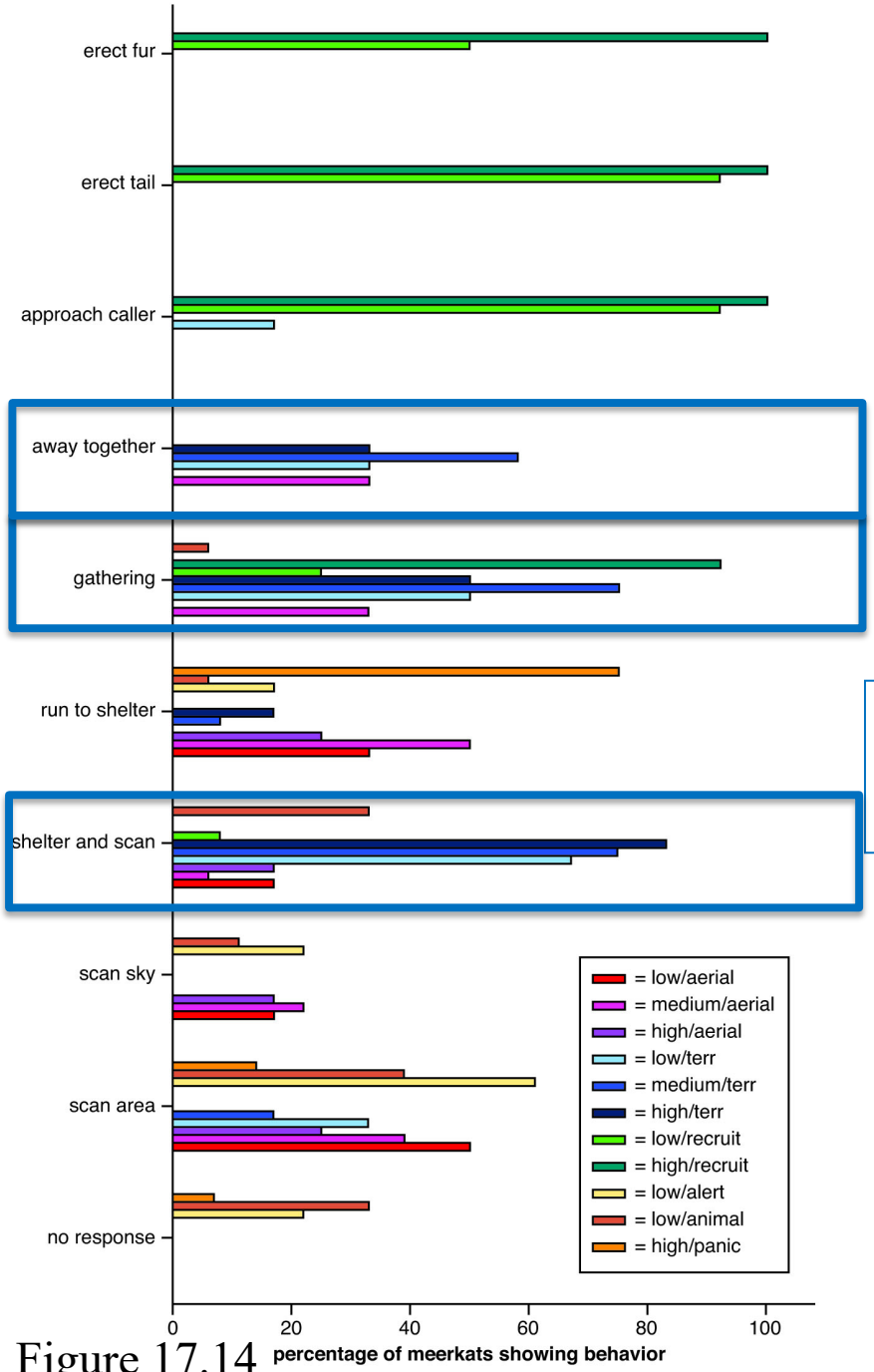

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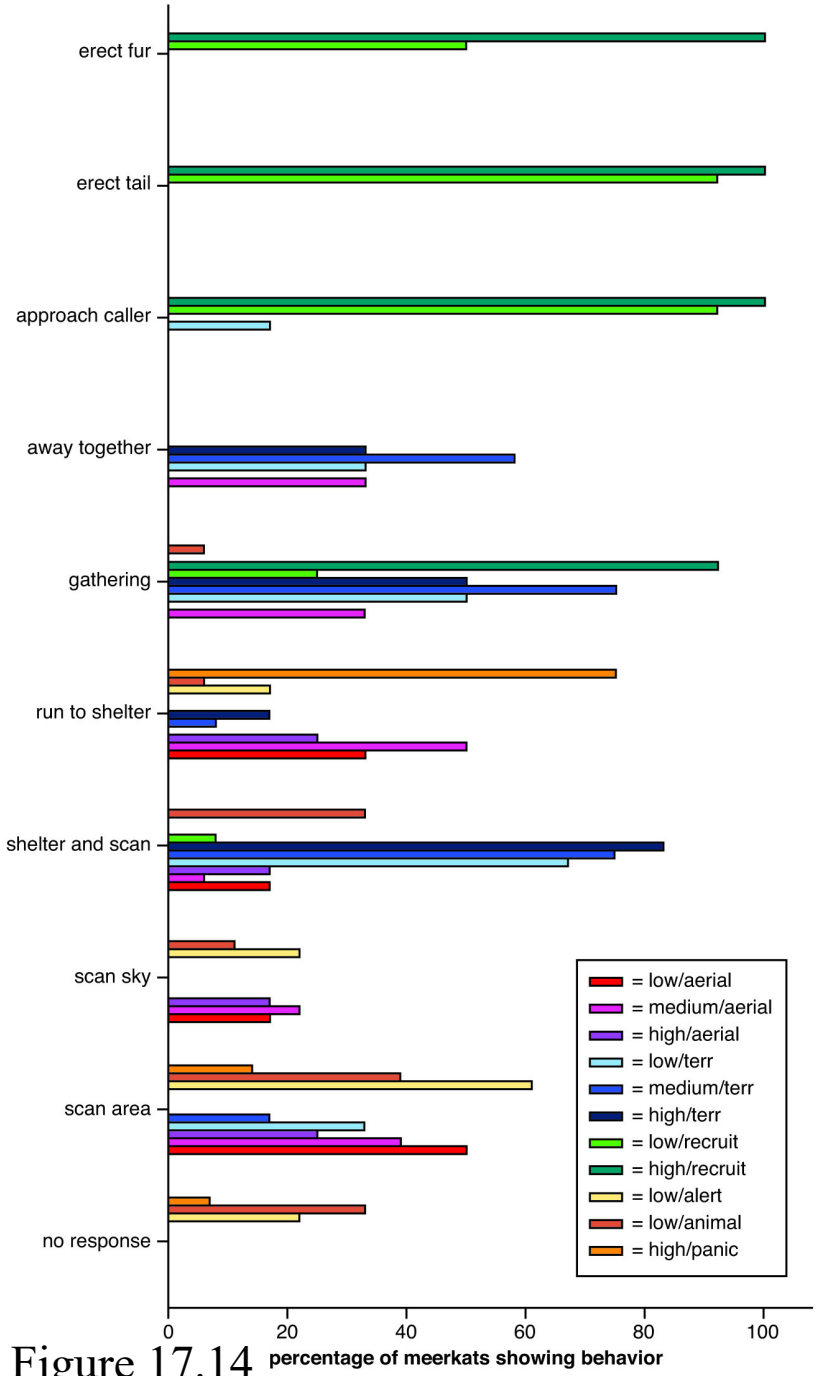

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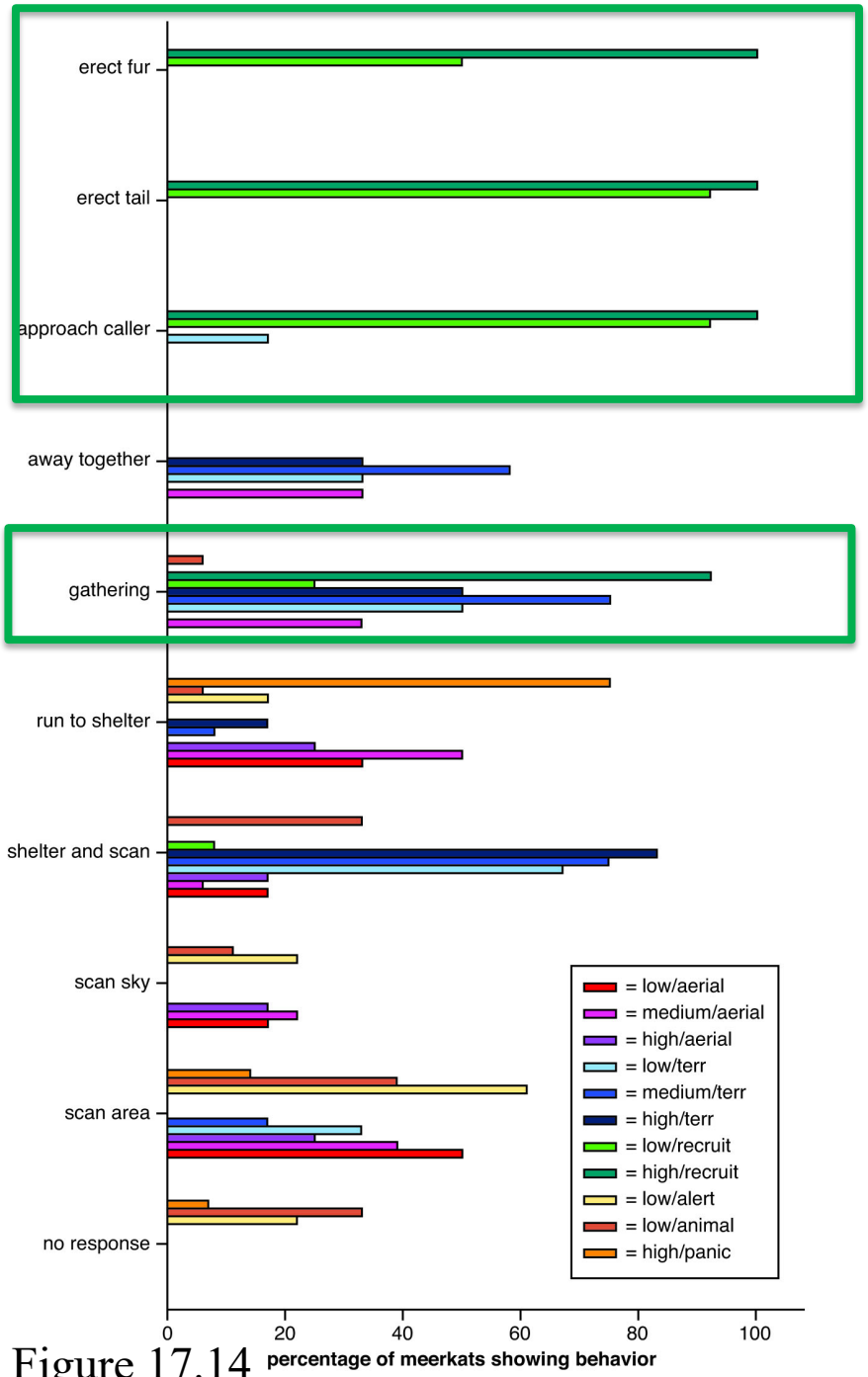

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Big Idea themes evident for behavior and information exchange in populations of animals

Themes:

- Imperfect information transfer produces variation.
- Information can be expressed without loss of content.
- Ability to transfer information is heritable, but information transmitted between individuals is non-heritable
- Populations can adapt and evolve new mechanisms of information transfer, or communication. That heritable information provides for continuity of life.