Natural animal communication, continued

Do animal signals have meaning to receivers?

functional reference

affective vs. referential communication

What explains the type of communication system a species has?

Do signallers have theory of mind?

audience effects (next time)

Affective vs. referential communication

1. The call elicits a response directly (affective)

   "lion!"  
   \[\rightarrow\]

2. The call evokes a representation of the predator (referential)

   "lion!"  
   \[\rightarrow\]

Alarm calling in chickens (video)

- Two kinds of predators
- Ground predators:
  - dogs, foxes, raccoons
- Aerial predators:
  - eagles, hawks
Different predators elicit different alarm calls
Sonagrams: sound frequency vs. time
Aerial predators scream

Ground predators series of short “clucks”

Testing whether calls are used

Maybe the receiver responded to the predator, not the signal
With vocal communication, play back recorded calls to see if response is to the call itself

Play recorded alarms: What do chickens do?
Behavior is appropriate
Ground alarm stand tall, look from side to side
Aerial alarm crouch down look upward
Functional reference: Two requirements

Stimulus ➔ animal signals

“Aerial predator” ➔ Crouch, Look up

Signal ➔ response in another animal
Does the signal “mean” the stimulus (e.g. aerial predator)

Vocal communication in vervet monkeys
(Cheney & Seyfarth; Roberts, website)

3 kinds of alarm calls
• Snake
• Eagle
• Leopard

Each call ➔ specific appropriate behavior
Functional reference, as in chickens

Do alarm calls evoke a representation of the predator? Tests with diana monkeys
Diana monkeys: Further evidence for representation of the predator…

- Learn to respond to calls of other animals (e.g. chimpanzees) in the area (recall the film)
- Most economical to assume all are associated with a common representation (like an associative concept)

Another example of response to calls based on meaning, not sound

Vervet monkey social calls, given as another group approaches: “wrr” and “chutter”

Monkeys look toward the hidden loudspeaker when the call is played

Chickens call about food
Food calls seem to represent food

Effect of recent feeding on response to food calls, as compared to ground alarm calls. Recall “reinforcer revaluation” studies.

But not all calls are referential…..

Alarm calls don’t have to “mean” the predator

- Alarm calling in Belding’s ground squirrels: affect (response urgency)
- “near predator” (high threat) → run into burrow
- “far predator” (low threat) → stand up and look around
- Doesn’t matter what predator (e.g. hawk or dog)
- Calls arouse fear (or tell the listener what to do): affective
- Only one escape tactic available

Meerkats (film): Calls are affective and referential

3 kinds of alarm calls
- Eagle, goshawk: scan the sky, run to a bolthole
- Jackal, dog: gather together, approach the speaker, then flee
- Snake: gather together, raise tails, mob the snake
Calls vary with closeness of threat (urgency)

Affective or referential? Each is true sometimes
1. The call elicits a response directly  
   ![lion call diagram]
2. The call evokes a representation of the predator  
   ![lion call diagram]
What is the best evidence for reference?

Comparing communication systems: Summary
- Diana monkeys
- Vervet monkeys (Social calls)
- Chickens
  - Predator type (ground vs. aerial)
  - Food
- Belding’s ground squirrels
  - Response urgency/affect
- Meerkats
  - Predator type and urgency
- Referential communication: Not a matter of “intelligence” or type of species; think of ecology
Semantic combinations? Putty-nosed monkeys

- Leopard: “pyow”
- Eagle: “hack”
- “pyow + hack” -- group moves further