



The Brain, Biology and Cognition

Language: The difference between human and animal communication

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Animal communication

- Animals can communicate with each other in simple and complex ways.
- Evidence from Ethology – the study of animal behaviour in natural settings
 - Pioneered by Konrad Lorenz (1903-1989)
 - Imprinting of chicks and the critical period
 - When chicks bond with the first moving object it sees





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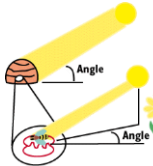


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Honeybees (Karl Von-Frisch, 1950)

- Social insects
- Specialised roles e.g. worker bee = sterile female who finds food for the community
- Forage for pollen
- Return to hive and 'tell' other workers the location of the pollen
- Round dance
- Waggle dance
 - Round dance = direction
 - Number of waggles = distance





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Vervet Monkeys – Seyfarth et al (1980)

- Social and communicative
- Different alarm calls signal predators and elicits response
 - Eagle call – look to sky
 - Leopard call – flee to trees
 - Snake call – look down



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Criteria for Language

- What are the differences between these examples of communication and language used by people?
- Different in?:
 - The range of events that can be communicated
 - Flexibility in how the message is conveyed
- How can we define human language?
 - Language involves “associating a finite number of words, with particular meaning or concepts, and using a finite number of rules to combine those words into a potentially infinite number of sentences” (Harley 1995)

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Language design features

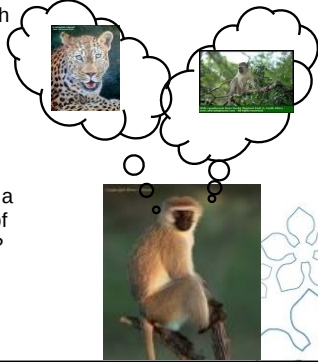
- Many (often complementary) design features specified by researchers – ‘what makes language’
- Criteria for comparing animal to human communication
- Comparative approach tells us more about our own nature of language
- **Aitchison (1983) focused on four features he argued to be unique to humans**



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Criteria 1. Semanticity

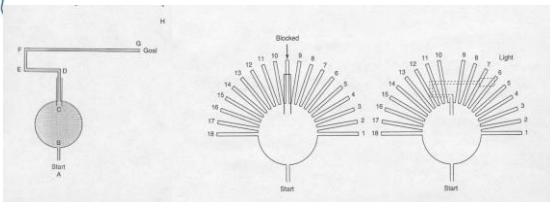
- Human language – each word has at least one specific meaning
- Vervet monkeys – each call elicits a different response – is this semanticity?
- Does the monkey have a mental representation of the meaning of the call?



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Animals can have mental representations

- E.g. Tolman (1932) – maze learning in rats



- Maybe Vervet monkey's can convey meaning via mental representation

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Criteria 2. Displacement

- Across Time / space ; true / hypothetical situations
- Step away from current true state of affairs
 - We can talk about what 'might' be true or a time that has not yet been reached (e.g., "where is the exam?")
 - Abstract concepts represented (e.g., Love, justice, truth)
- Consider the honey bee:
 - Spatial displacement from bees (and perhaps time)
 - But... "Bees will never dance a book on the psychology of the bees dance" (Harley, 1995 p. 10)

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Criteria 3. Structure dependence

- Human language is characterised by a series of symbols that are abstract
- Words put into units of meaning in which their **position** in the sentence is important to the meaning generated
- E.g. “water bird” vs. “bird water”
- The set of rules that govern how words are combined is **syntax** (Chomsky, 1960)



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Criteria 4. Creativity

- Human language allows us to produce utterances that have never been expressed before
 - Novel utterances
- Flexible and infinitely productive
- Can animal 'language' be this flexible?



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Primate language learning

- Washoe the chimp (Gardner and Gardner, 1967)
 - Raised like a human infant
 - Learned American Sign Language (ASL)
 - acquired 132 signs
 - Most signs were 'natural' chimp signs e.g. hurry, more
- Sarah the chimp (Premack, 1971)
 - Metal backed chips and a magnetic board
 - Chips symbolised
 - nouns (chocolate, dish, Sarah),
 - verbs (give, insert),
 - concepts (same, if-then),
 - adjectives (red, yellow)
- Generalisability to novel contexts
 - Sarah selected chocolate after being told it was a brown object



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Structure dependence

- No strong evidence for primate **grammar/syntax**:
 - E.g. Terrace et al (1979) – Nim chimpsky
 - Put 'more' before other words (e.g. chocolate, tickle) more often than chance (suggests grammar)
 - But the communications compared were largely mind-numbingly similar
 - More drink, more drink
 - More Nim, more Nim
 - Banana Nim banana Nim
 - Banana eat more Nim
 - Grape more Nim eat
- "Give orange me give eat orange me eat orange give me eat orange give me you!" – meaning and syntax?



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A major difference

- Quality of '**recursion**' in human language
 - Embedding of packets of meaning
 - E.g.
 - *The man, who had just been to town, where the big shopping centre was (which had just been built), stopped to look at his watch, which he had just purchased in town, briefly.*
 - This recursion adds a large degree of flexibility not apparent in animal communication
 - Complexity of meaning and information
 - Compare to the 'long' sentence of Nim for **meaning**



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Why are we interested?

- Language is closely linked to the idea of 'thought' a heavily human-based concept
 - An important concept!
 - Sapir-Whorf hypothesis (Whorf, 1956)
 - Language guides and defines thought and cognition
- Memory may be heavily reliant on language
 - E.g. Propositional representation
 - 'The car is behind the lorry' as way to represent information in memory
 - Working memory close relation to spoken language
 - Phonological processing, stores and rehearsal



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Summary

- Human language and animal communication
- Similar
 - Both use symbols to represent events in the world
 - Rely on sender and receiver sharing a representation
 - Likely that captured primates can learn the meaning of some arbitrary symbols for communication (as humans do)
- Different
 - Less evidence that animals can communicate beyond the 'here' and 'now' (abstract)
 - Intensive training of primates produced linguistic abilities of young human child
 - Syntax in language more human
 - Recursion a human language sophistication
 - Semantics: difficult to fully test but possibly more human
- Qualitative differences not just quantitative
