

# PLINX204 PSYCHOLINGUISTICS

## LANGUAGE ACQUISITION – 2006 - 3

### Linguistic evidence (2)

Species-specificity, Evolution, Categorical perception, the Language of Thought, the Modality neutrality of the Language Faculty.

Basic reading: Hauser et al, 2002; Petitto, 2005.

Subsidiary reading: Pinker & Jackendoff, 2005; Fitch et al, 2005.

#### 1. Species-specificity:

One of the traditional arguments for innateness (genetic determination) of part of the language faculty is its species-specificity. In general, species characteristics are uncontroversially genetically determined: that birds have feathers, that sharks are ovoviviparous, that dogs bark, are all a result of their genetic make-up. By parity of argumentation, that humans have language as a species characteristic is also taken to show genetic determination.

2. a. Is the human language faculty species-specific?
- b. If so, in what respects?
- c. If not, does/would it alter the argument for genetic determination?

#### 3. Evolutionary considerations: FLB vs. FLN

a. If a property is innate it has presumably evolved (under specifiable physical conditions – whales are bigger than elephants because buoyancy diminishes the effect of gravity), so evidence from the evolutionary record, in particular, comparative analysis, can potentially give us insight into what is peculiar to us and what is shared with our relatives.

b. Our language faculty is complex, and we share some aspects of it with other organisms. Suppose we shared all our linguistic abilities with some other creature, either with one other creature or a variety such that we shared property x with A, property y with B and so on. Would this impugn the claim to genetic determination? No. Our visual system is basically the same as that of all vertebrates (with some interesting differences) but that doesn't mean that it is not genetically determined. Likewise 'categorical perception' below.

c. Hauser et al (2002): a detailed proposal regarding precisely which aspects of the language faculty have parallels in other creatures, and are therefore clearly not a special adaptation of *homo*, and which are unique to humans, and hence have presumably evolved relatively recently, though not necessarily in the interests of communication.

d. The core of the proposal is a distinction between the Faculty of Language in a 'narrow' sense (FLN), and the Faculty of Language in a 'broad' sense (FLB), where FLB

includes FLN as a proper sub-part. The language faculty is internal to a specific organism, a human being, with links to the external environment and to the rest of the organism. Some internal relations (memory), are intimately tied to the language faculty; some (respiration), are simply necessary prerequisites for the faculty to be able to operate. FLB includes all aspects of our communicative abilities, with FLN (the generative device which links sound and meaning) as a proper sub-part. This gives rise to the characterization in (4a), (Hauser et al, 2002:1570):

4a.

External Environment	Organism Internal		
Ecological	Memory	FLB Other	Respiration
Physical	FLB	FLN	FLB
Cultural	Sensory- Motor		Conceptual- Intentional
Social			
	Digestion		Circulation

4b. FLN includes *recursion*, expressed in terms of ‘merge’ and ‘agree’ and maybe *selection*. (‘Move’ is not a primitive but is a function of the other two, hence the term ‘internal merge’). “... a key component of FLN is a computational system (narrow syntax) that generates internal representations and maps them into the sensory-motor interface by the phonological system, and into the conceptual-intentional interface by the (formal) semantic system” (HCF, 2002:171)

5. Need to determine which of the following is correct (they argue for (5c)):
  - a. FLB is strictly homologous to animal communication
  - b. FLB is uniquely human
  - c. Only FLN is uniquely human

Most of FLB is shared except for the recursive system. That is, the interface systems are given and what evolved uniquely for humans was the computational system that links them.

6a. Shared aspects of FLB - sensory-motor:  
Vocal imitation (song-birds, whales); Aural discrimination (macaques); Categorical perception (chinchillas); etc.

b. Shared aspects of FLB - conceptual-intentional:  
Theory of Mind (chimpanzees?); The capacity to acquire conceptual representations (rhesus monkeys); Imitation (gorillas); etc.

7a. Categorical perception (see e.g. Kuhl & Miller, 1975; Smith 2002, ch. 6)

Differences between speech sounds (e.g. Voice Onset Time (VOT)) are continuous, but we perceive them categorically.

- i. Human adults for VOT and other linguistic contrasts
- ii. Babies for VOT and other linguistic contrasts
- iii. Humans for other categories (e.g. plucks versus bows on a violin)
- iv. Chinchillas for VOT and other linguistic contrasts ...

7b. The properties of LoT must include recursion to account for the generality, creativity and compositionality of thought, independent of its communicative function.

8. What is genetically determined? Is speech special?  
(see Lieberman, 2000, 2001; Petitto, 2005; Smith, 2005, ch.11)

“Syntactic ability, which generally is taken by linguists ... to be a unique human attribute, is present to a limited degree in language-trained chimpanzees ... The sole aspect of human linguistic ability that chimpanzees lack is speech” (Lieberman, 2001:37). That is, spoken language is basic: it is what we have evolved for, and language in any other modality – e.g. sign – is derivative or secondary. This seems to be wrong (Petitto, 2005).

9. Evidence from ‘Milestone data’: In first language acquisition, all of **Babbling**, the First word stage, Two word stage, Vocabulary explosion, Subsequent grammatical development in terms of parameter fixing, ... are the same in deaf and hearing infants.

- 10a. To make it relevant to language acquisition, it is necessary to establish that babbling is ‘linguistic’ not simply motoric (see Holowka & Petitto, 2002).
- b. Distinguish Vocal babbling from Manual babbling.
- c. Deaf children babble vocally – indicating that it is endogenously driven – and then stop.
- d. Sign-exposed babies (both hearing and deaf) indulge in manual babbling.

11a. “Beginning at birth and continuing through age 5 and beyond, speaking [children] and signing children exhibit the identical stages of language acquisition, including the ‘syllabic babbling stage’ (7 to 10 months approximately) as well as other developments in babbling, including variegated babbling (ages 10 to 12 months) and jargon babbling (ages 12 months and beyond ...)” (Petitto, 1997:47-48).

b. "... bilingual and bimodal hearing infants exposed to signed and spoken languages produced two kinds of babbling – manual and vocal – and did so within the same developmental time period" (Petitto, 1997:55).

12. What is common to the two kinds of babbling? It "reflects babies' sensitivity to specific patterns at the heart of human language ... particularly the rhythmic patterns that bind syllables, the elementary units of language ..." (Petitto et al, 2002:35). It is then unsurprising that we have categorial perception for hand movements. (Petitto, 2005:94).

a. Test of 6 hearing babies: 3 born to deaf parents and exposed to no speech; 3 born to hearing parents and exposed to speech as usual. If "babies are born with sensitivity to specific rhythmic patterns that are universal to all languages, even signed ones, then the linguistic hypothesis predicts that differences in the form of language input should yield differences in the hand activities of the two groups" (ibid).

b. "Optotrak analyses revealed that sign-exposed babies showed a significantly different type of low-frequency rhythmic hand activity from speech-exposed babies, as well as another type of high-frequency rhythmic hand activity that speech-exposed babies also showed and used almost exclusively" (ibid). And the former appeared to use 'sign-space' in a way the latter did not.

13. Conclusion: We are 'neurologically plastic', with "a genetic component underlying language acquisition that is biologically 'flexible'" (Petitto, 2005:100) – i.e. neutral as between speech and sign. We even know where this plasticity resides: "... P[lanum] T[empore] tissue constitutes a key brain site [which underpins] 'Adaptive Phonological Differentiation'." "This tunes the infant's perceptual system to find salient, and attend to, ... maximally contrasting, rhythmically-oscillating bundles of about 1.2 – 1.5 seconds" (Petitto, 2005:100).

14. General conclusions: Species-specificity is an argument for genetic determination, irrespective of what we share with our cousins; what is genetically determined is independent of modality.

#### Additional references:

Holowka, S. & L.A. Petitto (2002) "Left hemisphere cerebral specialization for babies while babbling". *Science* 297:1515. (Aug 30.)

Petitto, L.A. (1997) "In the beginning: On the genetic and environmental factors that make early language acquisition possible". In M. Gopnik (ed) *The Inheritance and Innateness of Grammars*. Oxford, OUP; pp. 45-69.