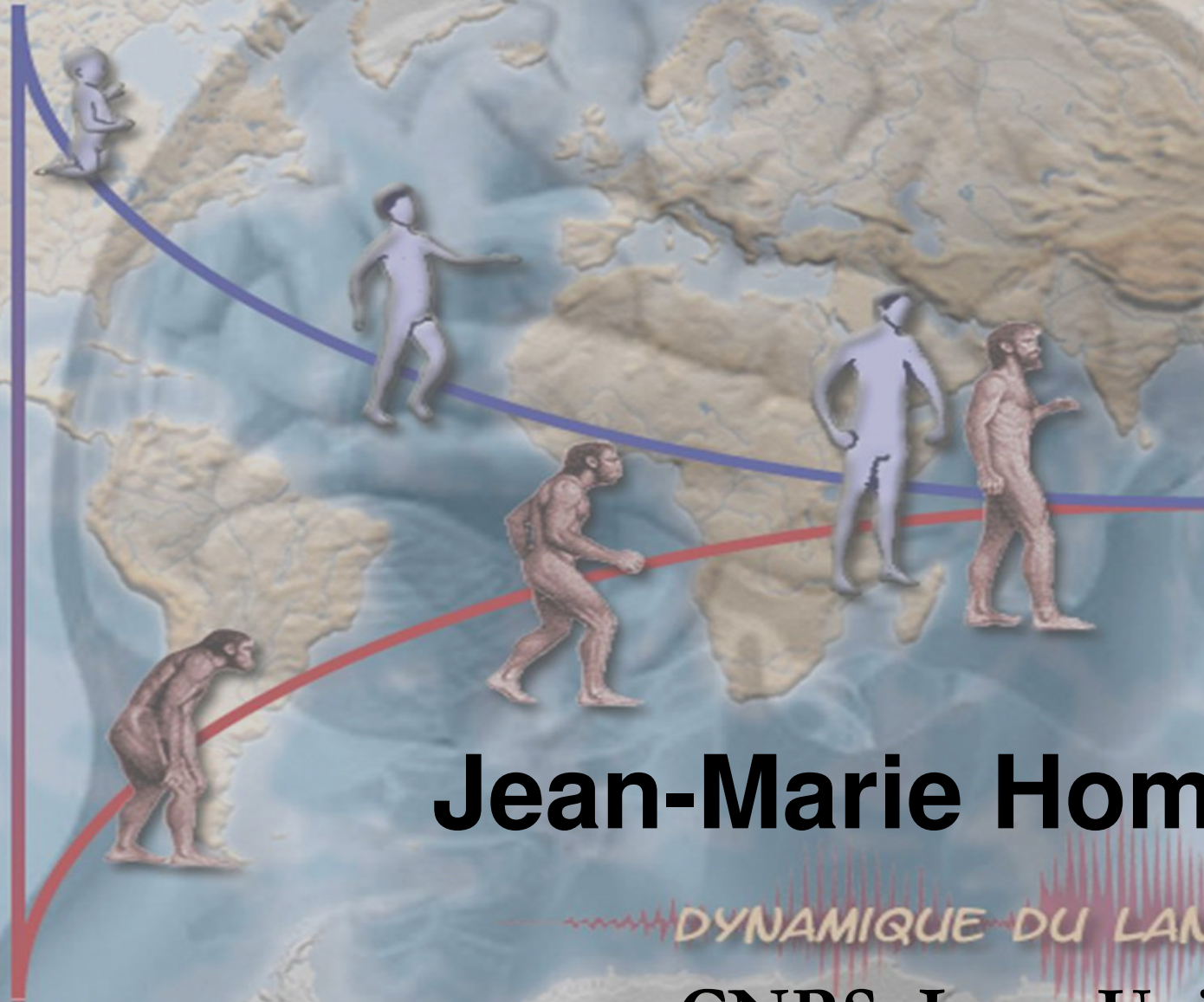


# Complexity in Human Language



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*DYNAMIQUE DU LANGAGE*

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- Are all languages spoken to-day equally complex?
- Measuring linguistic complexity
- Evolution of linguistic complexity
- Emergence of linguistic complexity

# Are all languages equally complex?

- Primitive languages?
- Two views
  - All languages are equally complex
    - balancing hypothesis : lack of complexity in one component will be compensated by greater complexity in another
  - Languages vary in complexity
    - Piraha (Everett), Rau Indonesian (Gil)
    - Variation is related to the ecological context (Creole languages, MacWhorter)

# All languages are equally complex

« The total grammatical complexity of any language, counting both morphology and syntax, is about the same as that of any other »

Hockett (1958)

- Number of segments (and tones) vs. word length
- Morphology vs. syntax

# Piraha (Everett, 2005)

- Amazonian language (300 speakers)
- No recursion
- No counting system
- Two color terms (« light » and «dark »)
- Restricted number of kin terms

# Measuring linguistic complexity

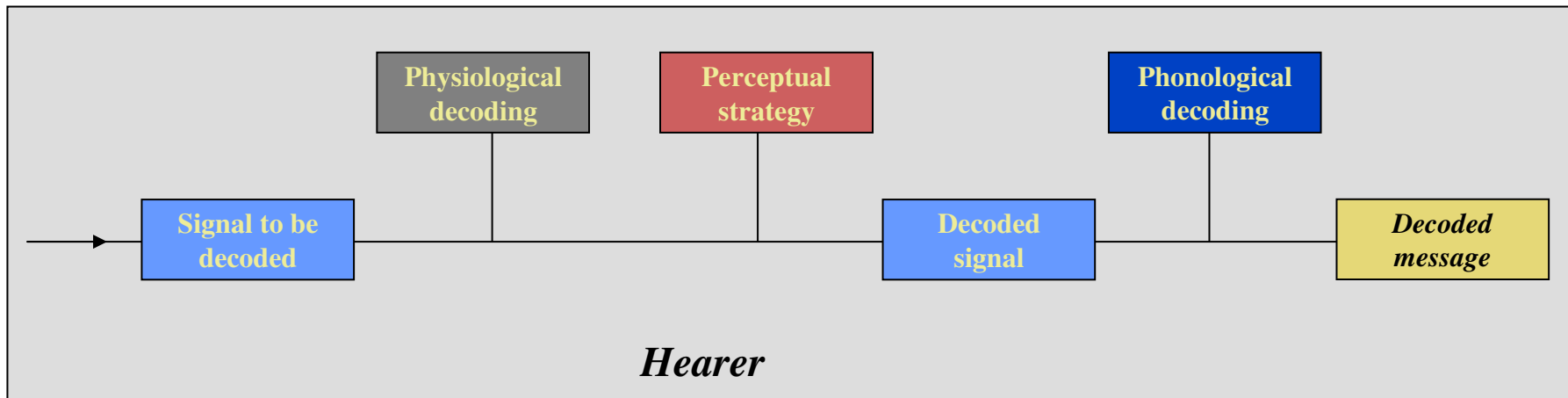
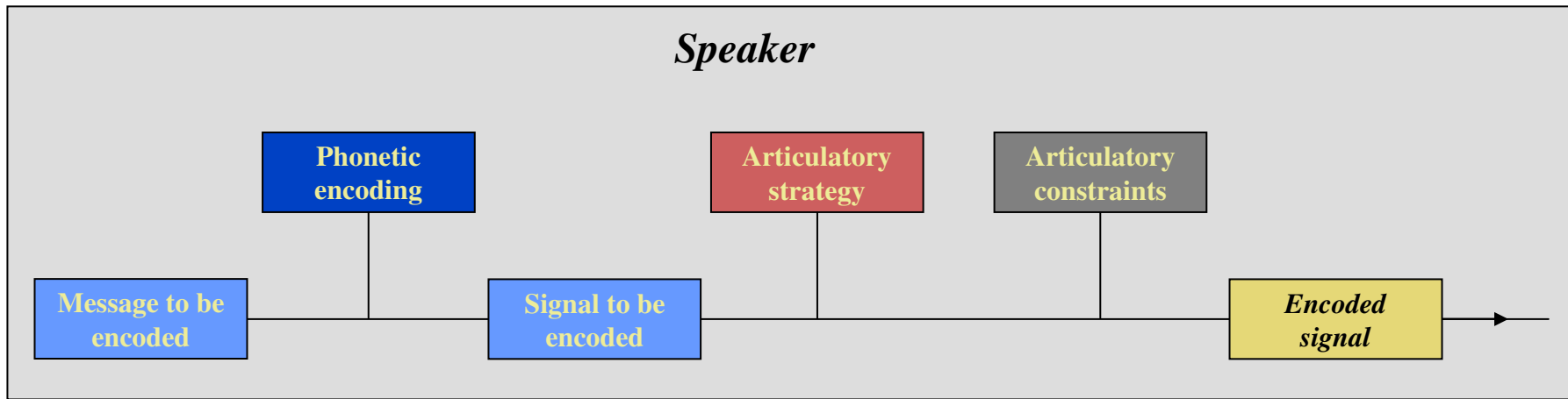
- Synchronic complexity
- Complexity for linguist or for speaker?
- Complexity, frequency and « markedness »
- Complexity of linguistic system :
  - phonology (Pellegrino, ANR)
  - morphology
  - syntax

- Complexity of language processing :  
reaction time (or its distribution)  
age of acquisition
- Integration of complexity of sub-systems?

# Evolution of linguistic complexity

- Diachronic complexity
- Linguistic change in sub-systems :  
Phonology, morphology, syntax, semantics
- Source of linguistic change :
  - role of **individual** linguistic systems  
(structuralist school, generative grammar)  
Each individual has a specific linguistic system  
Individual differences are the source of linguistic change
  - role of speaker vs. hearer





- Universals vs. diversity
- Are universals an illusion?
- Attractors give an impression of stability
- Is the study of diversity more interesting for Cognitive Sciences (Evans and Levinson, BBS)

# Emergence of linguistic complexity

- Language origin : « Taboo » scientific domain
- Renewed interest : interdisciplinary pressure  
Population genetics, computer science,  
neuroscience, archaeology, paleoanthropology
- Continuity between Animal Communication  
System and Human Systems

- Emergence of linguistic structures
  - Holistic vs. synthetic : Syntax vs pragmatics (Wray, Arbib, Mithen)
  - Words : naming games (Steels)
  - Syntax : Lexicon vs syntax (lexical explosion) (Kirby)

Information exchange = social status (Dessalles)

Polygenesis vs. Monogenesis (Coupé and Hombert)

Population size and prestige (Coupé and Hombert)

# Continuity vs. discontinuity

- *« C'est une chose bien remarquable qu'il n'y a point d'hommes si hébétés et si stupides, sans excepter même les insensés, qu'ils ne soient capables d'arranger ensemble diverses paroles, et d'en composer un discours par lequel ils fassent entendre leurs pensées; et qu'au contraire, il n'y a point d'autre animal, tant parfait et tant heureusement né qu'il puisse être, qui fasse le semblable. »*

Descartes, Discours de la méthode, 1637

- *« The unboundedness of human speech, as an expression of limitless thought is an entirely different matter from animal communication because of the freedom from stimulus control and the appropriateness to new situations... Modern studies of animal communication so far offer no counter-evidence to the Cartesian assumption that human language is based on an entirely different principle. »*

Chomsky, 1966, p.77-8

- *« But the question whether an ape has a language faculty is a meaningless question and therefore nobody should talk about it . »*

Chomsky, cited by Belsack et al 1999, p 35

- *« I cannot doubt that language owes its origin to the imitation and modification, aided by signs and gestures, of various natural sounds, the voices of other animals, and man's own distinctive cries. »*

Darwin, 1872, p. 56



# Role of vocalizations

- Group cohesion
- Avoid predators
  
- Access to food
- Reproduction

- Vocalizations are non-voluntary, linked to an emotional state (role of context)
- Signals cannot be segmented or recombined to create new sequences
- Signals are not directed at specific individuals
- The production of vocalizations originates from subcortical and limbic regions of the brain  
(not from cortical regions used for speech by humans)

# But communication is more than...

- Vocalization among non-human primates
- Articulated language among Homo sapiens

# Borderline Human language

- Isolated « words »
- Cries, Laughs
- Music??
  
- ... Close to characteristics of primate vocalizations

# Communicative gestures used by non-human primates

- About thirty gestures have been identified by Tomasello and colleagues (chimpanzees, bonobos, gorillas)
  - Raise one's arm
  - Hit the ground
  - Touch another individual
- Imperatives (request)
- Directed at specific individuals
- Great variability, Individual innovations

# Communicative gestures

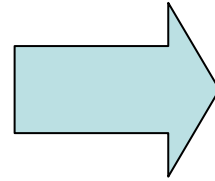
- Intentionals, non emotionals  
(Tomasello : visual signals in visual field, tactile signals in non visual field)
- Use of right hand  
(Vauclair, baboons; Hopkins, chimpanzees)

# Analogic vs.digital

- Human sound system : digital
- Borderline signals are analogic  
(laughs, cries)

# Primates

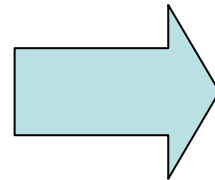
- **Vocalizations**



# Homo sapiens

**Borderline language**

- **Communicative gestures**



**Langage**



# Out of « here and now »

- Notion of **displacement**
- ACS do not have displacement
- Bees and ants do have some form of displacement
- All communication systems are adapted to the needs of a particular species (niche construction theory)
  - non-human primates/humans : different needs
  - bees and ants/humans : recruitment

# Time windows

- 6-7 Millions years : East side story
- 200 Ky : Biologically Modern Man
- 100Ky : Culturally Modern Man  
(Ornaments)
- 70 Ky : Linguistically Modern Man  
(Toba?)

# Two stages of language evolution

- Darwinian stage : need to improve sophistication of communication system (selective advantage, very long process)
- Non- Darwinian stage : changes in communication system are not improving efficiency of system (« cultural changes »)