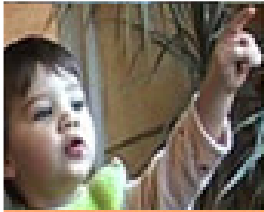




*Emotions*  
*langage acquisition and music*  
Christelle Dodane, Karine Martel, Aliyah Morgenstern

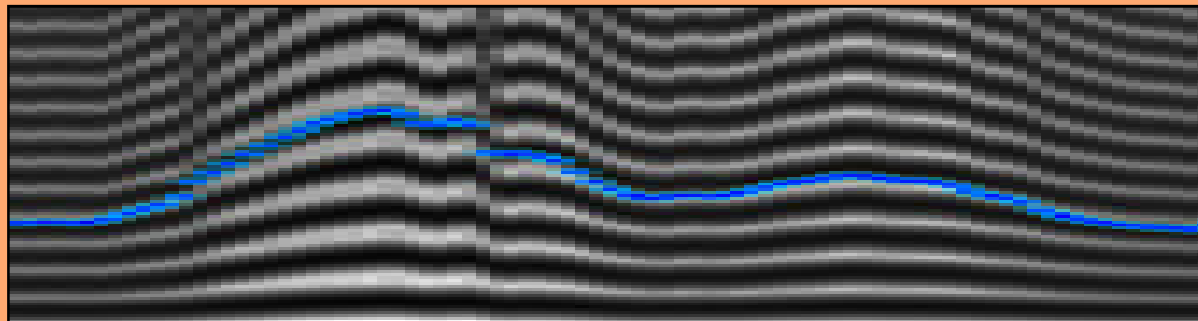
ENS-LSH Lyon,  
Laboratoire DIPRALANG, Université Paul Valéry, Montpellier III  
J.E.P.A.L.M. – P.P.F. Modesco, Université Caen, Basse-Normandie

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# Musical elements

- At the beginning of life, there is a **common ontogenic path for language and music** in pre-verbal communication
- **Same « musical elements » and their acoustic correlates** (Papousek & Papousek, 1981)
  - Pitch, tone, interval, melody, loudness, stress, tempo, rhythm

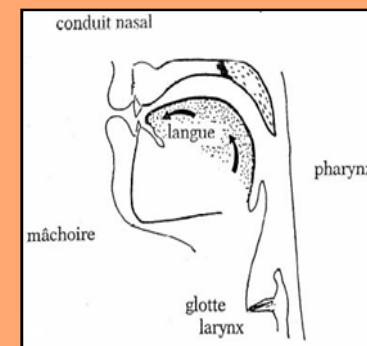
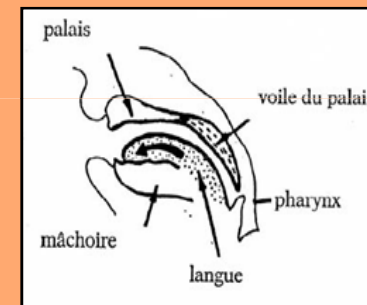


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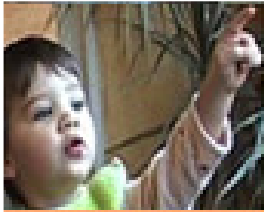
# Musical elements

- Musical elements are produced by the **lower part of vocal tract** :
  - Control of pitch, timing & intensity
  - In new-borns, similar shape as « infra-humans » (Lieberman et al., 1972) and monkeys
  - Change of configuration during the first year of life (Lieberman et al., 1972)
- Prosody is proposed as the **earliest form of hominid vocal communication**



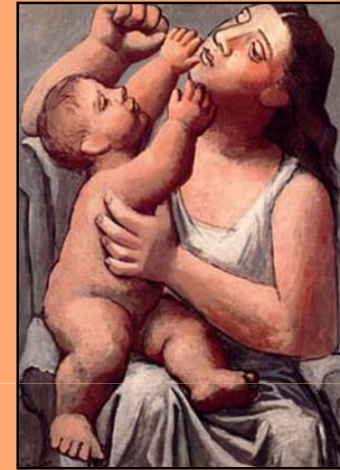
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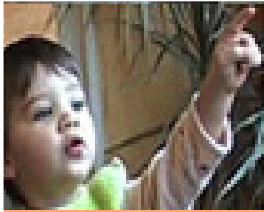


# Motherese

- Musical and affective qualities are gradually associated to specific forms by adults in « **motherese** »:
  - Vocal adjustments are **perceptually well matched to the young infant's perceptual and attentional capabilities** (Fernald and Kuhl, 1987)
  - **The earliest and strongest musical experience** (Papousek & Papousek, 1981)

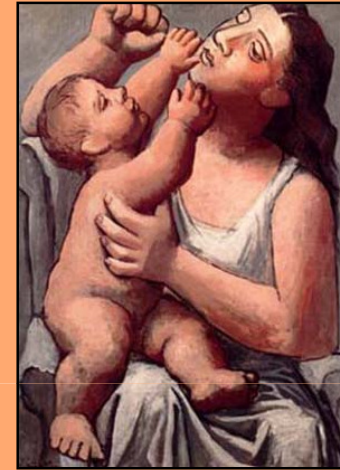


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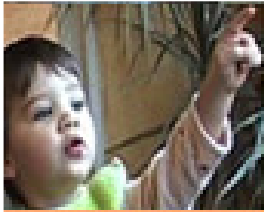


# Motherese

- **Important functions** in the development of communication to preverbal infants:
  - **Communication of affect**
  - Expression of **different** communicative **intentions** by using stereotyped melodies
    - Rising contours: to elicit and/or maintain attention
    - Falling contours: to soot a distressed infant
    - Bell-shaped contours to maintain attention

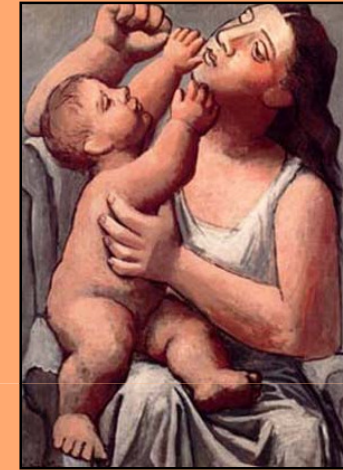


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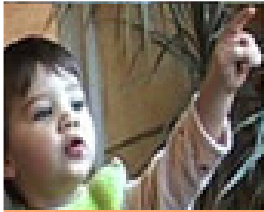


# Motherese

- « Bell shaped contours »:
- to maintain attention

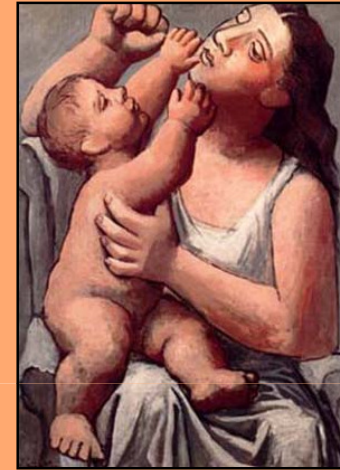


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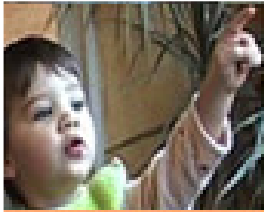
# Motherese

- Later use of prosody to **facilitate processing of linguistic forms**
  - **Perceptual grouping** (Bregman, 1990)
  - **Turn-taking episodes** (Snow, 1977)
  - **Exaggeration of acoustic cues** corresponding to important syntactic boundaries
  - **New linguistic information** (Fernald & Mazzie, 1983)



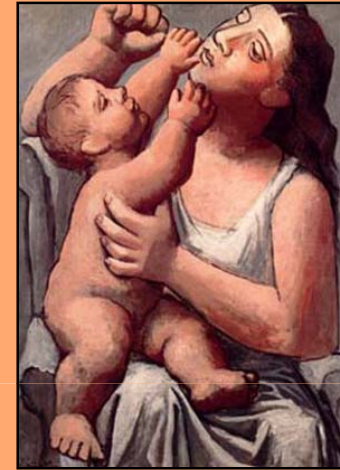
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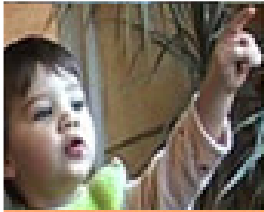


# Motherese

- **Important functions** in the development of communication to preverbal infants:
  - Use of musical elements to **adapt the child's behavior** to the interactional situation
  - Evidence for **acoustic similarity** among vocalization with the **same communicative intent**



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# Earliest productions

- In their earliest productions, children will be gradually able to express:
  - Their own emotions state (communication of emotions)
  - Their communicative intent to adults (speech acts)
  - Later, (transition from pre-linguistic to linguistic forms) referential elements

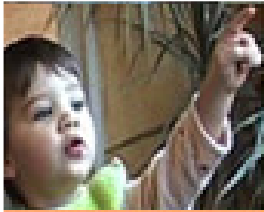
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# Earliest productions

- Children will **gradually learn to associate a prosodic form to a specific context:**
  - After the emergence of **reduplicated babbling** (~ 6 months), production of **different vocalizations according the context** (Konopczynski, 1990, 1991)
    - Pure vocal play when alone (absence of prosodic structuration)
    - Proto-langage in interaction (prosodic structuration) with melodic contour clearly interpretable for adults (de Boysson-Bardies et al., 1984)

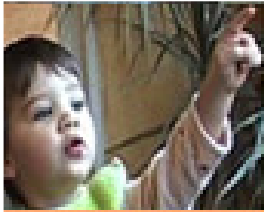
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# Earliest productions

- Major turning point of the later cognitive and linguistic development
- Few studies conducted on the **development of musical elements from the pre-linguistic to the linguistic period:**
  - Intra and inter-variability
  - Heterogeneity of pre-verbal prosody
  - Under-estimation of prosody during that period of transition

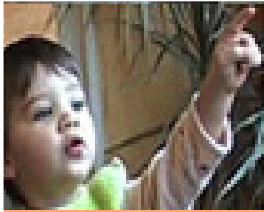
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# Objectives

- We assume that :
  - specific prosodic forms will emerge and stabilize
  - they will be anchored to specific contexts in specific interactional contexts
  - Infants will use intonation to express desires and intentions before they master conventional phonetic forms

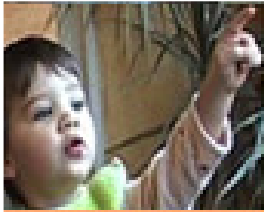
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# Objectives

- Objectives of the study:
  - To pinpoint the emergence and successive mastery of the different intonation contours according to their function in the child's productions
  - To pinpoint when one or several additional functions start being associated to a specific prosodic contour

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# Corpus Léonard

- 2 monolingual French babies, Madeleine (MAD) and Théophile



- Videotaped in spontaneous interaction with their parents, from 10 to 36 months
- Today, results up to 12 months (« holophrastic stage »)
- **Leonard corpus**: longitudinal data of 10 monolingual and bilingual babies

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# Methodology

- Entire phonetic transcription of children's productions (CLAN, Childes) →

The screenshot shows the CLAN software interface. On the left is a transcription window titled "[madeleine0\_11.cha]" with a menu bar (File, Edit, View, Tiers, Mode, Window, Help) and a toolbar. The transcription text is as follows:

```

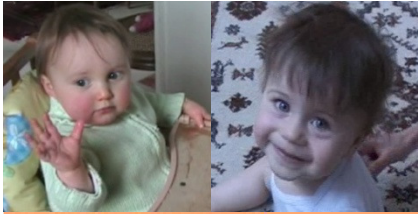
%pro: plat, court
%sit: regarde son cube
%int: monologue (action)
*CHI: yyy. ▪
%pho: /a/
%pro: plat
%sit: regarde Martine
%int: dialogue (??)
*CHI: yyy.
%pho: /jE/
%pro: plat
%sit: regarde Martine, avance la main vers elle
  
```

On the right is a video player window titled "madeleine-01-0\_11.mov" showing a child sitting on the floor with toys. Below the video player are controls including a time display (300637), a "Save" button, volume controls, and a "Repeat" button set to 0 msec.

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 %int: monologue (action)

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# Methodology

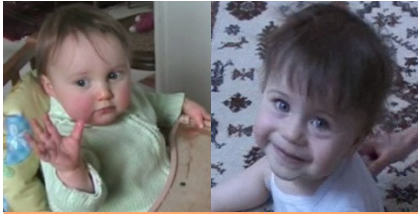
- Each utterance was coded for:

- **%pro: melodic contour:** flat, rising, falling, bell-shaped, etc.
- **%qua:** whispered, creaky...
- **%sit: situation of communication**
- **%int: interactional situation:** self centered (MONO) vs. to oriented to others (DIALO)

```
*CHI: yyy. ▪  
%pho: /ga/  
%pro: plat  
%qua: soufflé  
%sit: Mad joue, ne regarde pas Mot  
%int: monologue (action)
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- Melodic contours were coded by a trained musician and then, acoustically analyzed with Praat software.

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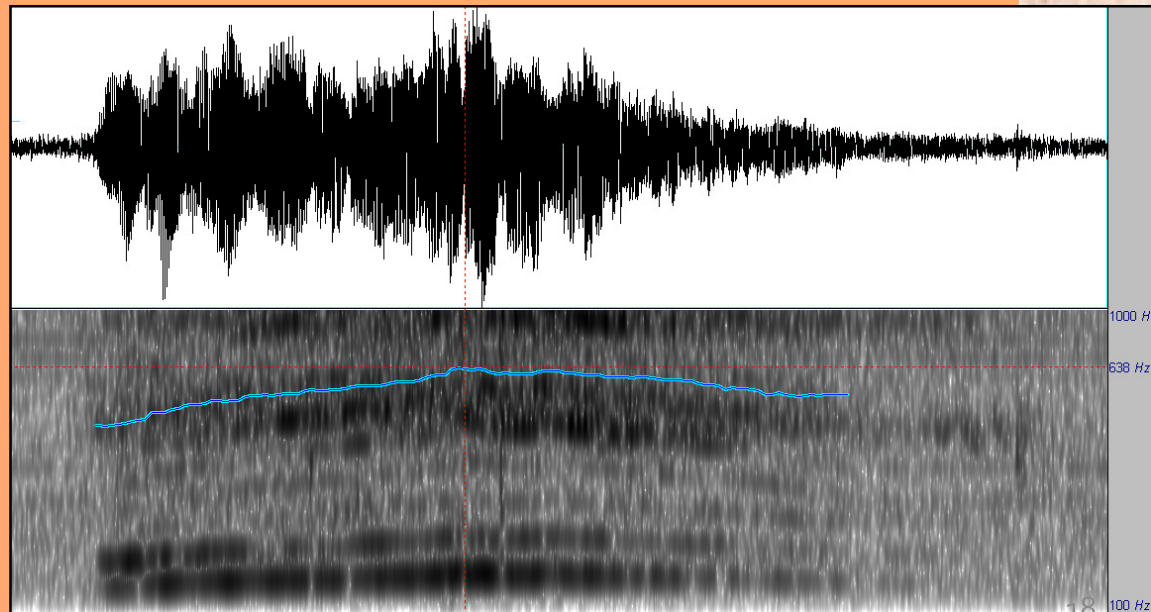
# Methodology

- Codes for an utterance (Madeleine, 10 months):

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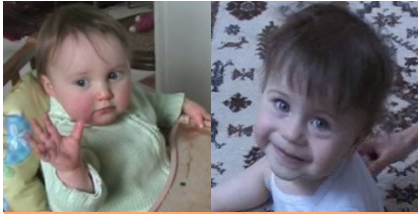


```
*MOT: 0 [=! chante]. ▪  
*CHI: yyy. ▪  
%pho: /E:/  
%pro: 1 cloche  
%int: dialogue  
%sit: Mad attend et comme Mot ne dit rien, Mad produit un nouveau  
contour en cloche
```



« Bell-shaped  
contour »  
(415-638-524 Hz)

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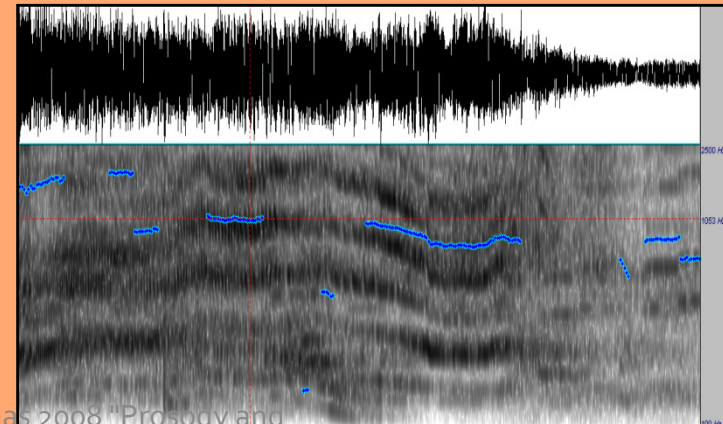
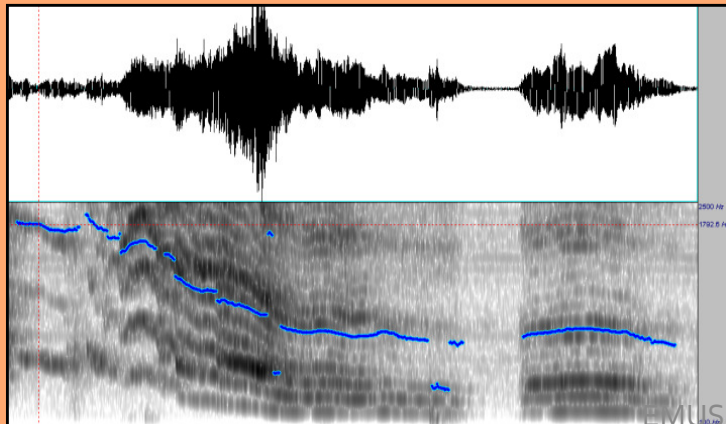
# Vocal play

- Productions of both children **change dramatically according to the type of interaction**
- **Small proportion of vocal play** (children are always video-taped with and by adults)
  - Extreme pleasure when they play with their own voice
  - Expression of their affective state (excitement)

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# Vocal play

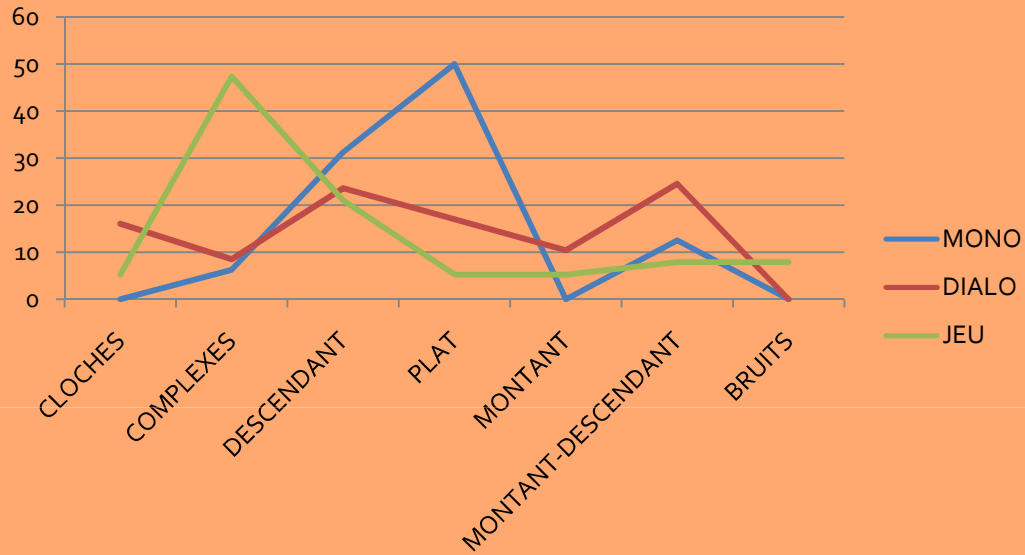


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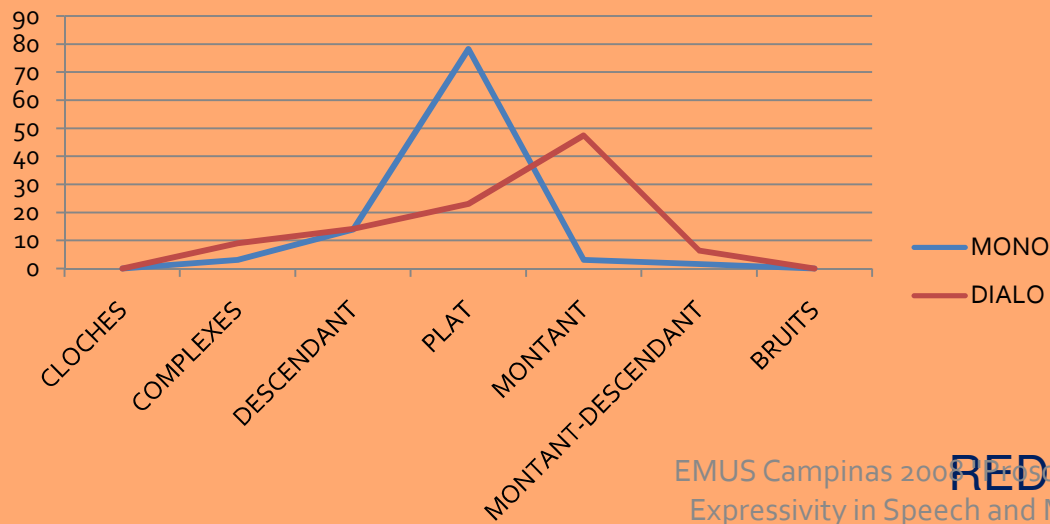


# Self-centered productions



**10 months**

MONO : flat (50 %)  
 DIALO : rising (25 %)  
 MD (22 %)  
 JEU : complex (45 %)



**11 months**

MONO : flat (80 %)  
 DIALO : rising (50 %)

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# Self-centered productions



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# Expression of emotions

- Exaggeration of prosody in motherese and direct and affective response from children
- Mother as a « **biological mirror** » for the developement of **imitative capacities** in children
  - Mutual imitation
  - Pitch adjustments

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# Expression of emotions

- In vocal interaction with adults, children exhibit some **signs of joy and pleasure**



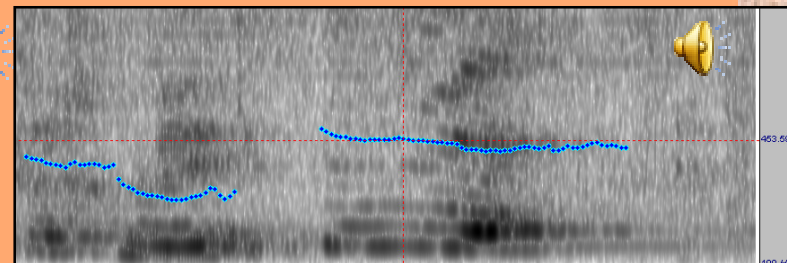
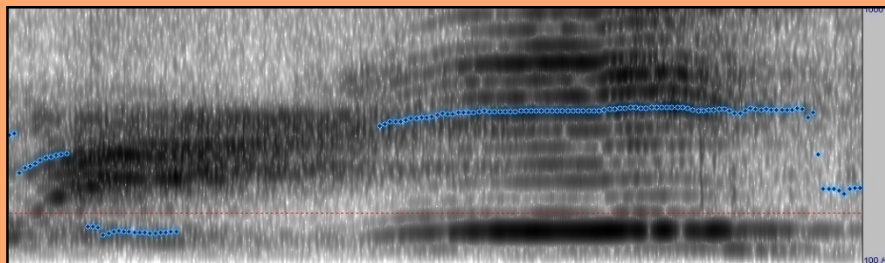
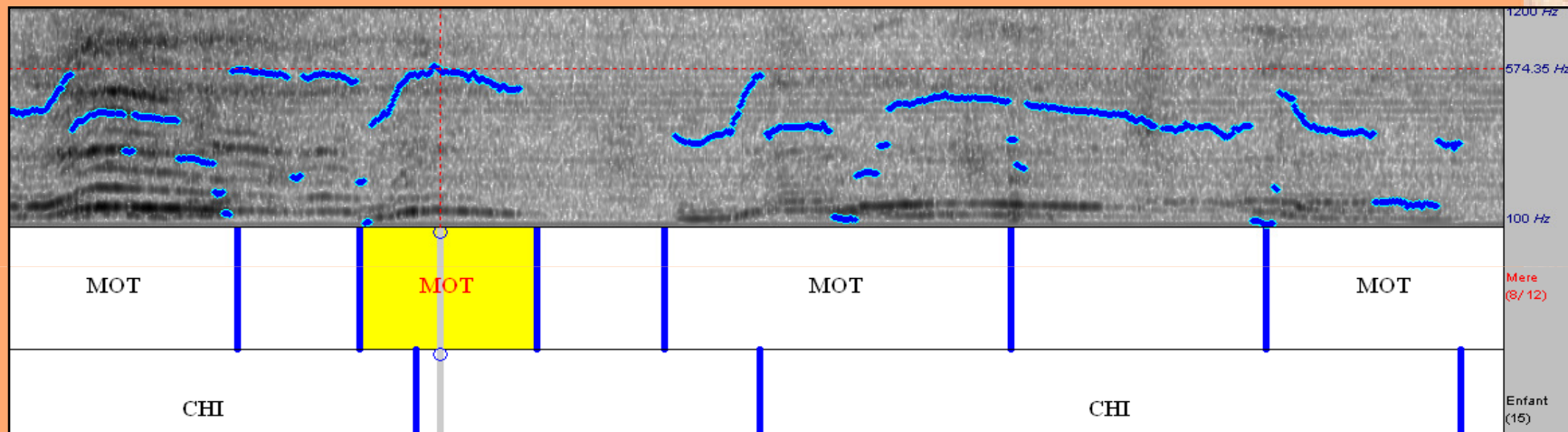
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# Mutual imitations

## Pitch adjustments



IMITATION of F<sub>0</sub> contour and phonemes

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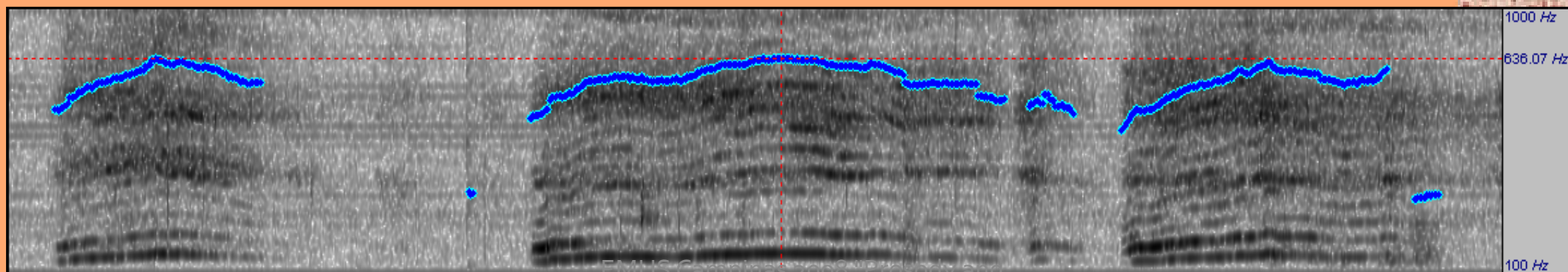
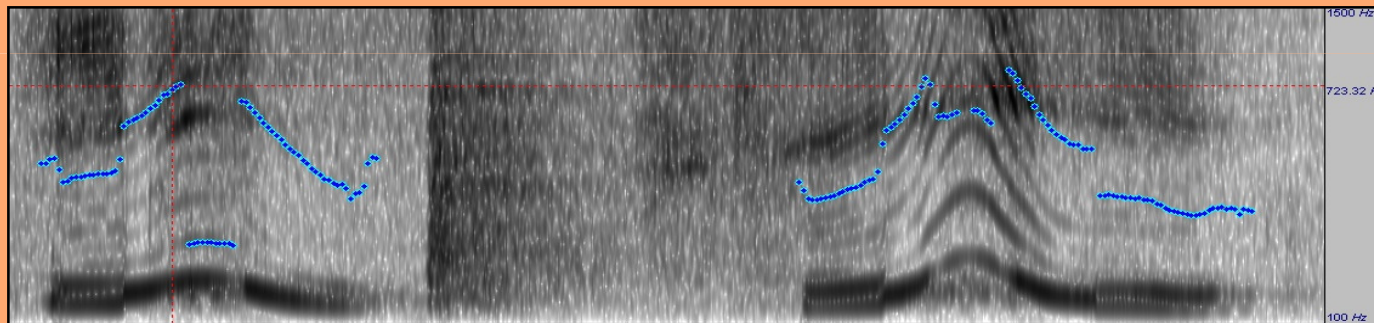
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# Expressing intentions

- Specific contours associated to specific communicative situations

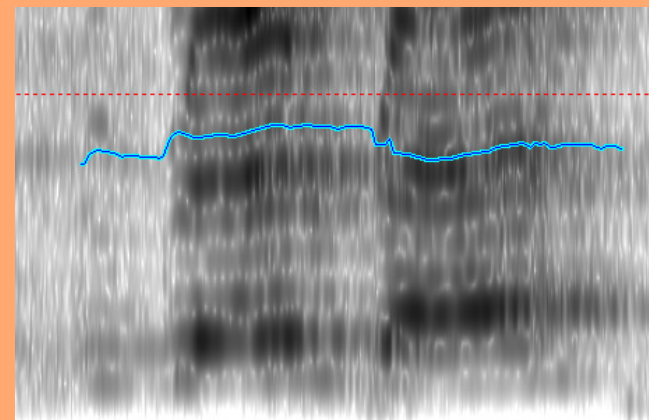
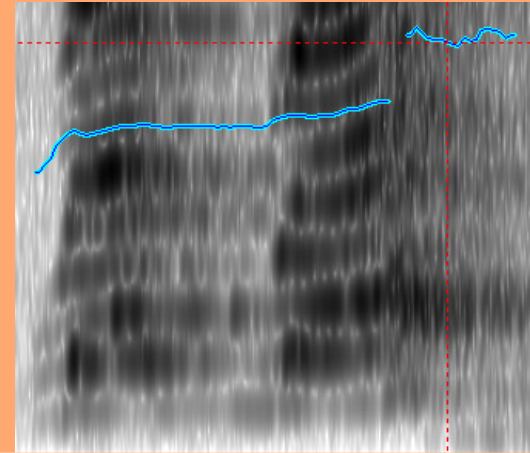
Bell-shaped contours: to initiate or maintain contact



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# Expressing intentions



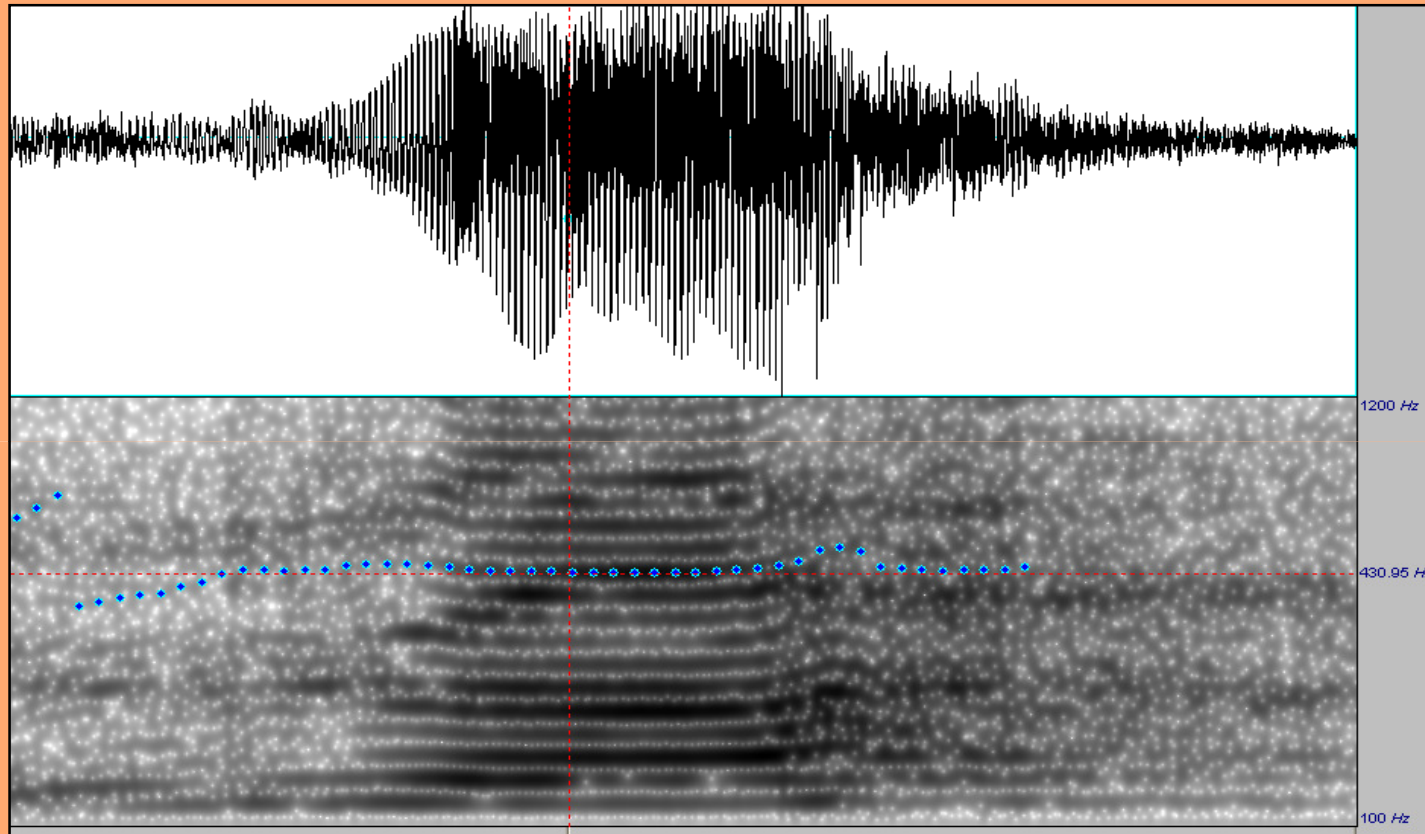
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Rising / falling contour: **to call someone**

EMUS Campinas 2008 "Prosody and Expressivity in Speech and Music"



# Expressing intentions



Rising-falling contour: to give something to someone

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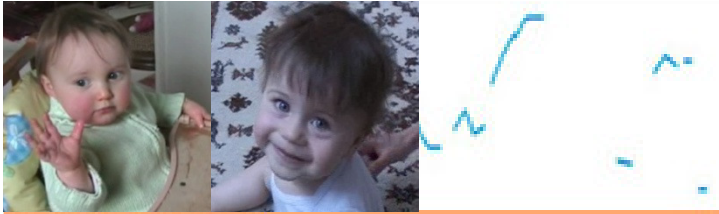
# Expressing intentions



Rising-falling: **tell something to someone**

EMUS Campinas 2008 "Prosody and Expressivity in Speech and Music"

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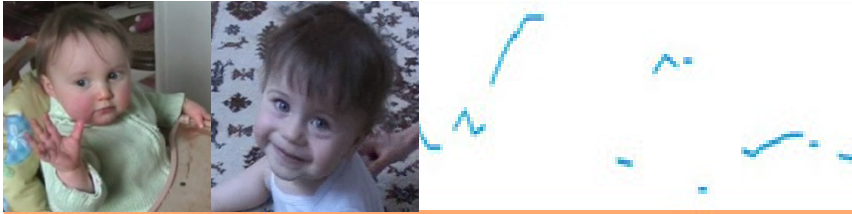
# Prosody and proto-words

- Emergence of the first « proto-words »
  - In both children, favorite phonetic form
    - MAD : [aga]
    - THE: [aji] ou [eji]
  - Associated with different prosodic contours probably to express different « meanings » in function of the communication situation.



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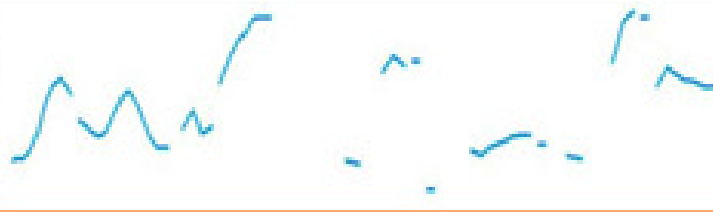
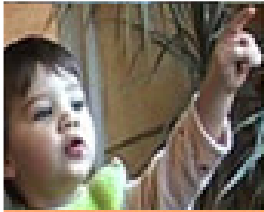




# CONCLUSION

- During, the pre-linguistic stage:
  - Productions are differentiated in function of context
    - Self- centered vocalizations vs. vocalizations produced in interaction
- Prosody provides a very rich and efficient way to:
  - Express emotions
  - Express different intentions (calling, telling, giving.....)
  - Favor the emergence of the first proto-words

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Thank you for your attention!!

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Bell-shaped contours: to initiate or maintain contact

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