



LINC

Laboratoire d'Informatique,
de géNie industriel, et de Communication
www.iut.univ-paris8.fr

IUT de Montreuil (Université Paris 8)
140, rue de la Nouvelle France
93100 MONTREUIL

Tél. : 01.48.70.37.00

Fax : 01.48.70.86.49

Responsable: Nelly BENSIMON
n.bensimon@iut.univ-paris8.fr

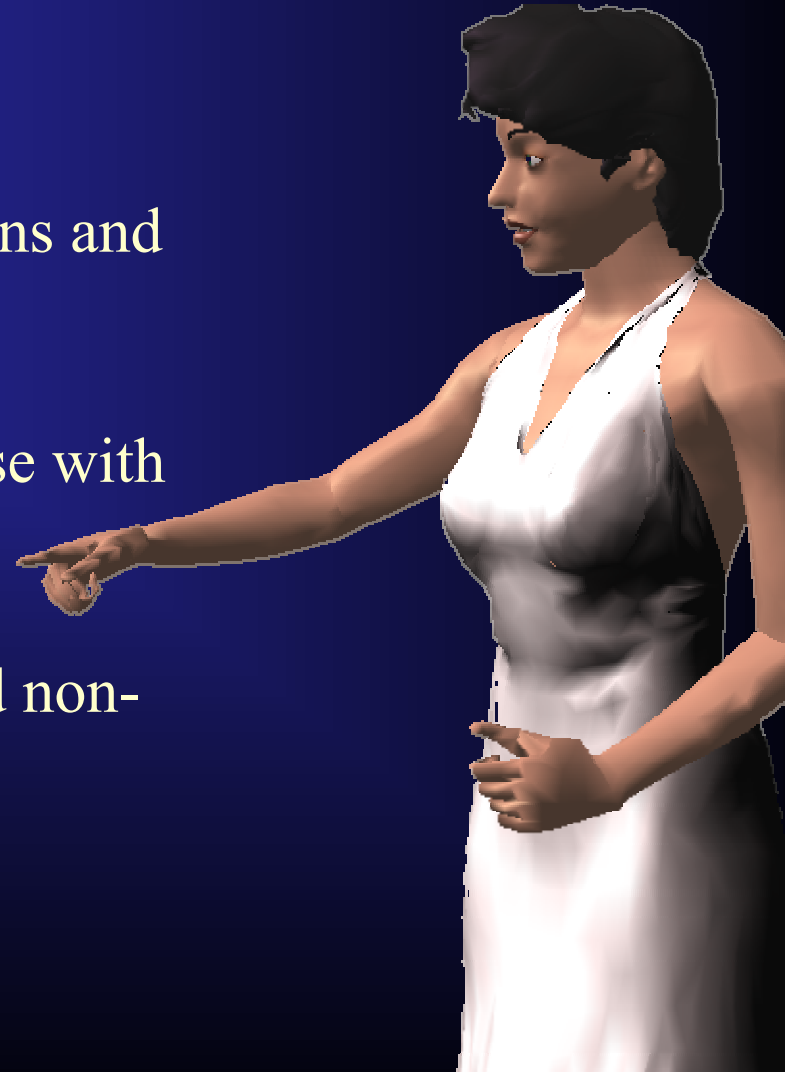


Deux axes de Recherche

- Communication
 - établir des paradigmes et des modèles d'interaction
 - définir les bases nécessaires à une **interaction personnalisée** et **adaptée** aux besoins de chaque utilisateur
 - considérer l'apport de la multimodalité
- Technologie
 - hypermédias
 - présentation graphique et de vidéo
 - agents conversationnels
- Approche pluridisciplinaire

Believable Interactive Multi-modal ECA

- **Believable** agent shows her emotions and has a well-defined personality
- **Interactive** as she is able to converse with the user in a given context
- **Multi-modal** as she uses verbal and non-verbal behaviors to communicate



Human-like Qualities

- The agent should be endowed with human-like qualities
 - Mental state
 - Ability to reason
 - Express feeling
- The agent should be able to adapt to the user
 - Decide what to say and how to say it



Communicative Functions

- Define a semantic topology of types of information to be conveyed
- Four broad classes of meaning:
 - Information about Speaker's belief
 - Information about Speaker's intention
 - Information about Speaker's affective state
 - Meta-cognitive information about Speaker's mental action
- Define an XML specification language APML (Affective Presentation Markup Language)



Lexicon

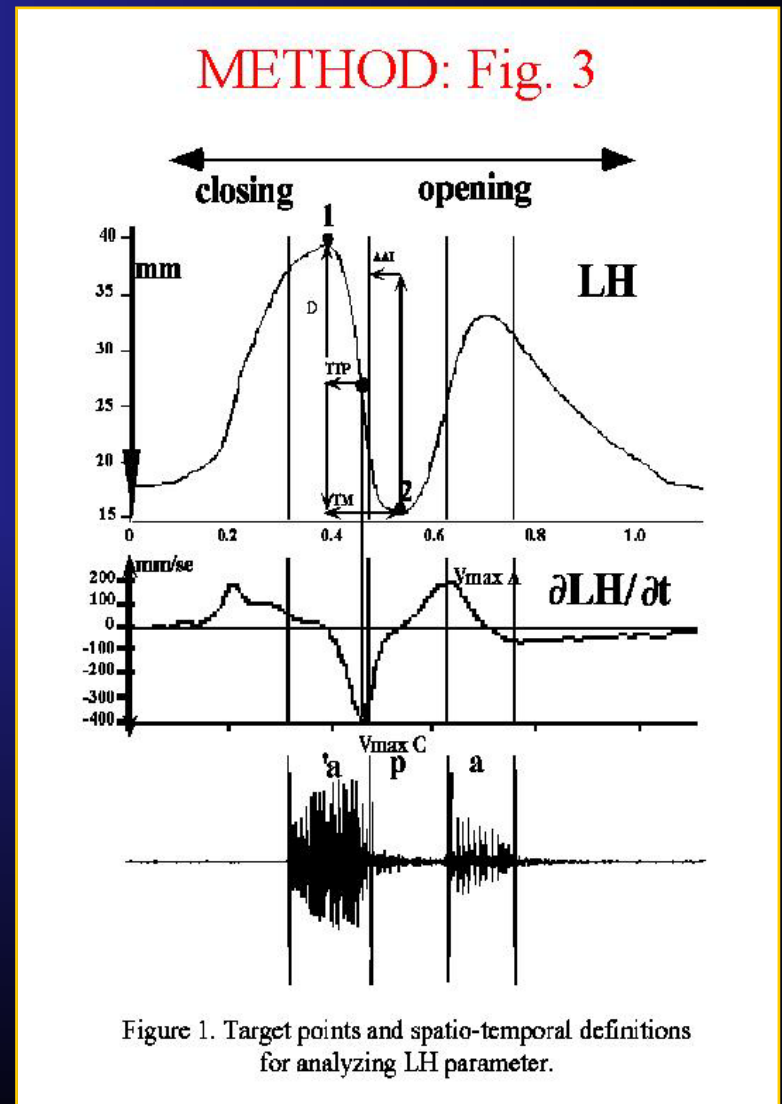
- **Deictic:** gaze direction, head direction
- **Certainty:**
 - Certain: small intensity frown
 - Uncertain: raised eyebrow
- **adjectival:**
 - Small, tiny...: small eye aperture
- **Belief relation:** contrast: raised eyebrow
- **Performative:**
 - Suggest: small raised eyebrow, head aside
- **Emotion:**
 - Sorry-for: head aside, inner eyebrow up
- ...

Language representation of nonverbal behaviors

- APML: Affective Presentation Markup Language
- XML-based mark-up language
- Describe the communicative functions
- Work at meaning level and not the signal level
- Independent of body and face models
- Separation of the body and the mind models

Lip Movement

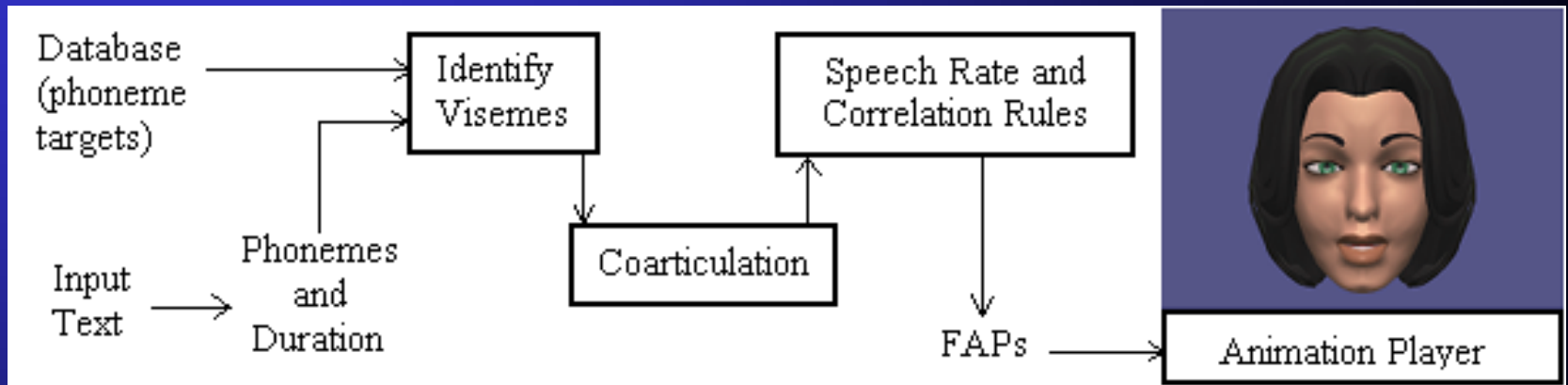
- Creation of a naturally speaking agent
- Lip readable movement
- Passive markers on speaker face
- Curves of lip contour parameters



Lip Parameter

- Phonetically and phonologically relevant parameters:
 - Horizontal width of lip contour: LW
 - Vertical height of lip contour decomposed into 2 parameters:
 - Upper lip height: ULH
 - Lower lip height: LLH
 - Upper lip protrusion: UP
 - Lower lip protrusion: LP
 - Jaw

Lip Shape Computation



- Two stages:
 - 1) Characterize each phonetically relevant parameters for the visemes associated with vowels and consonants
 - 2) Computation of coarticulation to simulate the influence of vocalic contexts over consonants

Example

<APML> <performative type = "inform" affect = "sorry-for"
certainty="certain">

I'm sorry to tell you that you have been diagnosed as suffering
from what we call angina pectoris,

</performative>

<belief-relation type = "elaboration-object-attribute">

which

<performative type = "inform" certainty="certain">

appears to be

<adjectival type = "small">

mild.

</adjectival> </performative> </belief-relation> </APML>

Gestural Lexicon

- Certainty:
 - Certain: palm up open hand
 - Uncertain: showing empty hands while lowering forearms
- Meta-cognitive:
 - Remember: snap finger
- Performative:
 - Assert: horizontal ring
 - Reproach: extended index, palm to left, rotating up & down on wrist
- Emphasis: beat
- ...

Gesture Planner

- Determination of gesture:
 - Look in dictionary
- Selection of gesture
 - Gestures associated with most embedded tags have priority (except beat): adjectival, deictic
- Duration of gesture:
 - Coarticulation between successive gestures closed in time
 - Hold for gestures belonging to higher up tag hierarchy (e.g. performative, belief-relation)
 - Otherwise go to rest position

Conclusion

- Creation of a Believable and Expressive ECA
- Integration and Synchronization of verbal and nonverbal behaviors
- Design of APML: Affective Representation Mark-up Language
- Gesture planner