

GESTICON

Catherine Pelachaud,
LINC - University of Paris 8
Brigitte Krenn and Hannes Pirker
OFAI



Aims and Purposes

- ◆ Aims:
 - player and graphics model independent.
 - description of a behavior: not specific to any particular model geometry nor model animation parameterization.
- ◆ Purposes:
 - Creating gesture shape, facial expression, body posture etc. can be very time consuming.
 - Allow for the mutualisation of work
 - Share behavior definition would greatly help the agent community

Aims and Purposes

Several attempts

- ◆ 2002: AAMAS ws « Let's represent and evaluate ECAs » (C. Pelachaud, T. Rist, Z. Ruttkay, K. Thorisson)
- ◆ ½ day ws at AAMAS 2002: B. Krenn, T. Rist
- ◆ 2003: 1st Gesticon meeting (B Krenn, C Pelachaud, T Rist, N Thalmann)
- ◆ 2005: 1st SAIBA meeting (N Badler, L Jonshon, B Krenn, S Kopp, S Marsella, C Pelachaud, K Thorisson, H Vilhamson)

Aims and Purposes

- ◆ Common ideas across these ws:
 - Study existing languages
 - Toward the design of a common Representation Language to control an agent and describe its behavior

Gesticon Representation Language

- ◆ Representation language for communicative behaviors only (no action, locomotion, etc)
- ◆ Refer to a variety of body behaviors such as facial expression, gaze behavior, head movements, hand-arm gesture, posture as well as combinations of these
- ◆ Existence of several dictionaries of emblematic gestures (Posner et al; Poggi; etc)

Gesticon Entry

- ◆ Units of nonverbal behaviors
- ◆ Hierarchical description of signals across modalities
- ◆ Different levels of description
 - very specified to under specified descriptions
 - what is the range from minimal information needed to maximal information depending on players technology
- ◆ Gesticon Entry:
 - descriptive part
 - link toward animation file

NOT a Gesticon Entry

- ◆ Mapping meaning/communicative functions to signals is done in a separate structure (eg table)
- ◆ No viseme specification
- ◆ Speech: use existing language representation (eg SSML)

Overall Structure of a Gesticon Entry

```
<GesticonEntry key ="UID"
  identifier="STRING" />
  <verbatim/>
  <form/>
</GesticonEntry>
```

- ◆ key: unique reference to form entry
- ◆ identifier: human readable description

Form Element

- ◆ <form> element: any communicative non-verbal behaviour
- ◆ sub-elements:
 - gesture: coordinated movement with arms and hands
 - hand_configuration: hand shape, fingers, orientation of the thumb
 - facial expression: muscular contraction
 - gaze: eye and head direction (include neck)
 - head: movement of the head independent of eyes
 - upper_body: movement of the spine and shoulder
 - posture: movement of the body elements downward from the hip

Form Element

- ◆ Any combination of sub-element possible
- ◆ Motivation of decomposition in sub-elements
 - physiology: muscular contraction and joint articulation
 - existence of studies on communicative non-verbal behaviors
 - computational factors: same hand shape used in different arm movements

Gesture Entry

- ◆ One or a sequence of basic gesture elements, each of which describing a basic hand-arm movement trajectory
- ◆ Phase attribute: preparation, stroke, etc
- ◆ Account for different theories: phase attribute is optional (Martell 2002; Bielefeld GeWi)
- ◆ Hand description follows the ASL hand shape configuration description
- ◆ Movement can be specified in order to allow for the representation of complex hand and finger movements

Movement Element

- ◆ Describe the trajectory of any articulated element, i.e. finger, hand, upper body, legs, head
- ◆ Two sub-elements:
 - timing: specify both the duration of a movement as well as its temporal alignment in relation to other movements within the gesticonEntry. A minimum, maximum and default duration can be specified in msec.
 - point: one or several keypoint
 - trajectory_type specifies the linear realization of the movement.
- ◆ Adoption of SMIL to specify temporal synchrony between sub-elements (seq and par)

Examples of GestureEntry

- **Example of a continuous movement:**

```
<base_gesture id="ID"
  phase="stroke">
  <movement
    trajectory_type="linear" >
    <timing/>
    <point wrist_position=""/>
    <point wrist_position=""/>
    <point wrist_position=""/>
    <point wrist_position=""/>
  </movement>
</base_gesture>
```

- **Example of a discontinuous movement:**

```
<base_gesture id="ID" phase="stroke">
  <movement trajectory_type="linear" >
    <timing/>
    <point wrist_position=""/>
  </movement>
</base_gesture>
<base_gesture id="ID" phase="stroke">
  <movement trajectory_type="linear" >
    <timing/>
    <point wrist_position=""/>
  </movement>
</base_gesture>
....
```

Facial Expression

- ◆ Difficulty to describe expression as a small set of parameters
- ◆ FACS: not so much used in ECA community, difficulty to become a FACS coder
- ◆ Our aim: encodes variability of larger clusters (smile, raise eyebrow, open mouth)
- ◆ (optional) decomposition of face into areas: eg based on FACS, Ekman 78
 - forehead_eyebrows, eye_lids
 - nose_cheeks, mouth,
 - chin_jaw, tongue

Facial Expression

- ◆ Temporal information: onset/apex/offset; attack/decay/sustain/release
- ◆ Temporal specification should cover:
 - static approach: full-blown expression of emotion (Ekman)
 - dynamic approach: gradual display of expression of emotion (Kaiser, Scherer)

Gaze Entry

- ◆ Complex element:
 - i. only eye direction,
 - ii. neck, head and eyes showing one direction
 - iii. neck, head and eyes showing individual directions
- ◆ Gaze direction specified through a mechanism for relative reference (a target in real/virtual world) or through spatial area

Head Entry

- ◆ Neck and head direction: specified via Gaze Entry,
- ◆ Head and neck movement: given by means of a movement trajectory and timing

Upper Body Entry

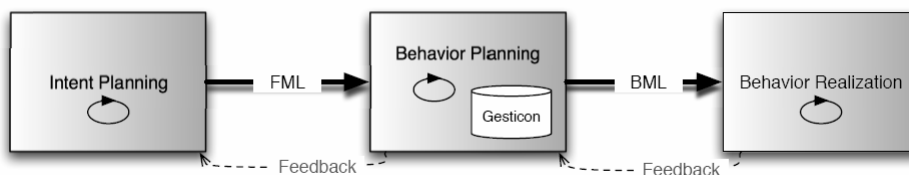
- ◆ Upper_body element:
 - specification for the neck, shoulders, spine and global movements of the torso.
 - The manner attribute of spine: posture of the upper body
 - upright and collapsed

Posture Entry

- ◆ The posture element involves the body elements downward from the hip
- ◆ Pelvis, hip, legs, (including knee, toes and ankle) are characterized by movement trajectory and duration.
- ◆ The specification of legs is analogous to the arms.

SAIBA Framework

- ◆ Towards a Common Framework for Multimodal Generation
- ◆ SAIBA: Situation, Agent, Intention, Behavior, Animation



Agenda

Tuesday 7.11.2006 (chair Brigitte)

- 09:30 - 10:00: Gesticon Talk, Catherine
- 10:00 - 10:30: Basic ideas behind SAIBA/BML (recap IVA presentation), Stefan
- 10:30 - 11:00: Recap of previous discussions, Hannes Högni
- 11:00 - 11:30: Coffee break
- 11:30 - 12:00: Gesticon, Hannes
- 12:00 - 12:45: General discussion (model, architecture, etc)
- 12:45 - 14:00: Lunch
- 14:00 - 16:00: BML discussion (chair Hannes Högni)
 - synchronization
 - levels and ways of behavior specifications
 - interplay with animation engines, how much is due to decisions of a specific animation engine? Experience from SmartBody, Greta, ACE, Nebula, Twente, ...
- 16:00 - 16:30: coffee break
- 16:30 - 18:00: Reusable behavior repositories like Gesticon (chair Stefan)
 - pros and cons
 - Gesticon: fundamental ideas behind it, what are the problems
- 18:00 - 18:30: wrap-up & recap, suggestions for day 2
- 20.30: Social dinner Heuriger

Agenda

Wednesday 8.11.2006

- 09:00 - 09:30: W3C Emotion Incubator group (Marc Schröder)
- 09:30 - 11:00: BML - pick up open issues, next steps (chair Hannes)
- 11:00 - 11:30: Coffee break
- 11:30 - 13:00: Towards FML (chair Catherine)
 - what are the major parts/aspects of FML
 - how flexible must FML be
 - can we learn something from designing EARL (the emotion representation language) for designing FML
- 13:00 - 14:00: Cooperation and organizational issues (chair Brigitte)
- 14:00 - 16:00: lunch and transfer to OFAI
- 16:00 -: meeting at OFAI (if needed)

Conclusion

- ◆ To which extent can Gesticon RL be
 - player independent?
 - body independent?
 - animation independent?
- ◆ Which constraints need to be specified for such aims?
- ◆ Can it use for other tasks (eg annotation of behaviors, behaviors recognition)?