Affective Virtual Human Animation

Arjan Egges, Nadia Magnenat-Thalmann

MIRALab – University of Geneva (http://www.miralab.ch)

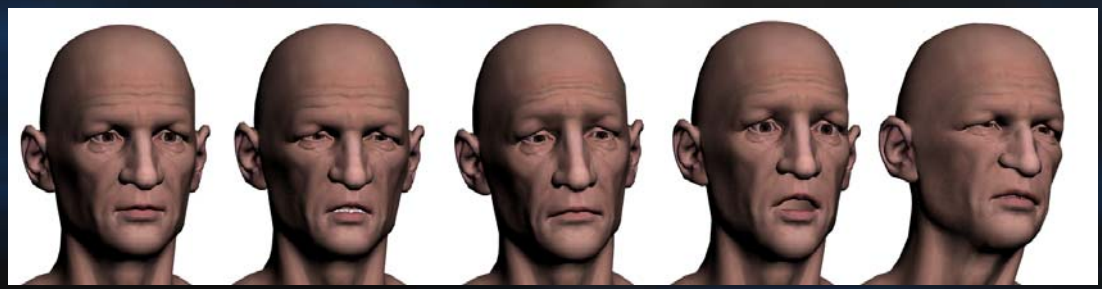
Alejandra Garcia Rojas, Mario Gutierrez, Daniel Thalmann, Frederic Vexo

VRlab – EPFL (http://vrlab.epfl.ch)

Introduction

Animating Virtual Humans:

- Facial Animation:
  - Speech, expressions, …
- Body Animation:
  - Idle motions, gestures, walking, reflex motions, …

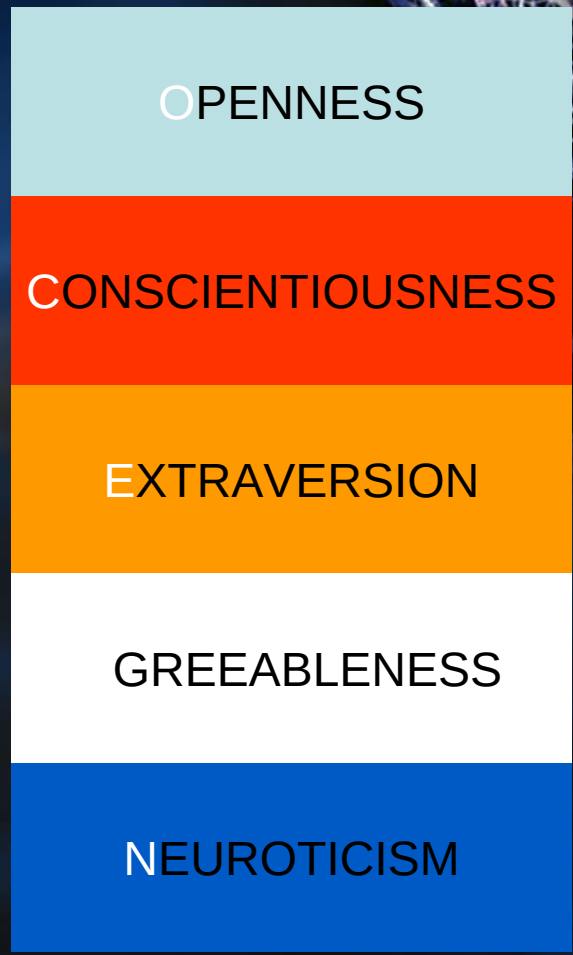


Overview

- Personality and Emotion for VHs
- Facial animation with emotion
- Body animation with emotion:
  - Idle motions
  - Gestures
  - Reflex motions
- Integration and blending
- Conclusions

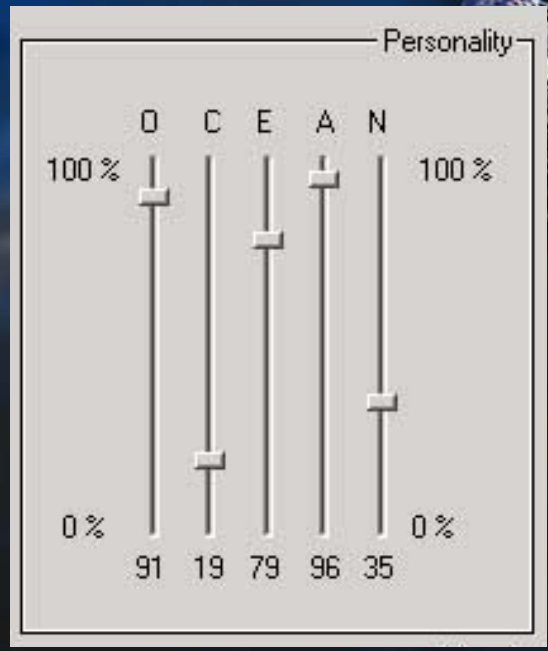
Personality & Emotion (1)

- Multidimensional models
- OCEAN Model: Openness to Experience, Conscientiousness, Extraversion, Agreeableness, Neuroticism
- PEN Model: Psychoticism, Extraversion, Neuroticism
- Many more!
- **http://www.personalityresearch.org**



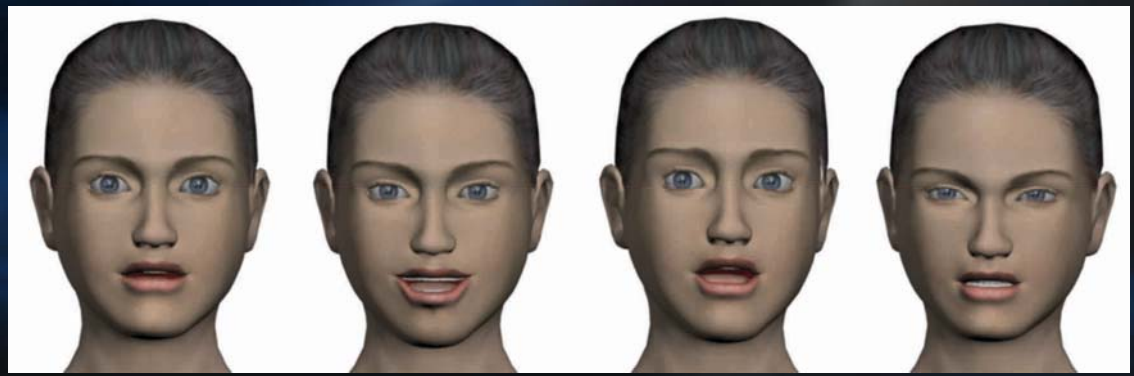
Personality & Emotion (2)

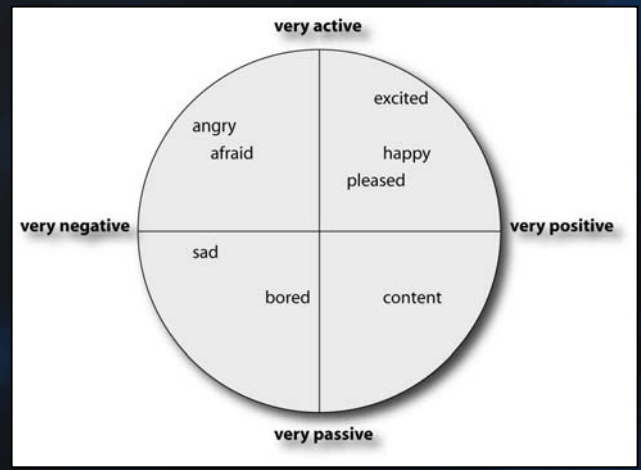
- OCEAN is the most commonly used one in simulation systems
- *N*-dimensional array of dimensions between 0-100%



Personality & Emotion (3)

- Dimensions of emotions
- OCC, Plutchik, Ekman, etc.
- Which emotion theory fits best for VHs?





Personality & Emotion (4)

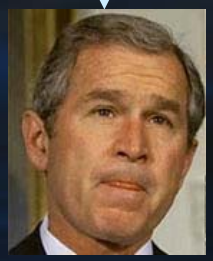
Perception

Physiology

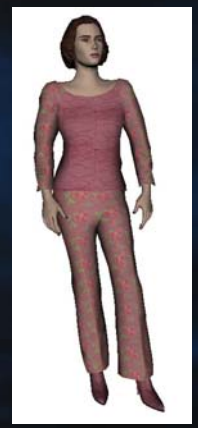
Personality/Emotion Simulator

Facial expressions

A.I.

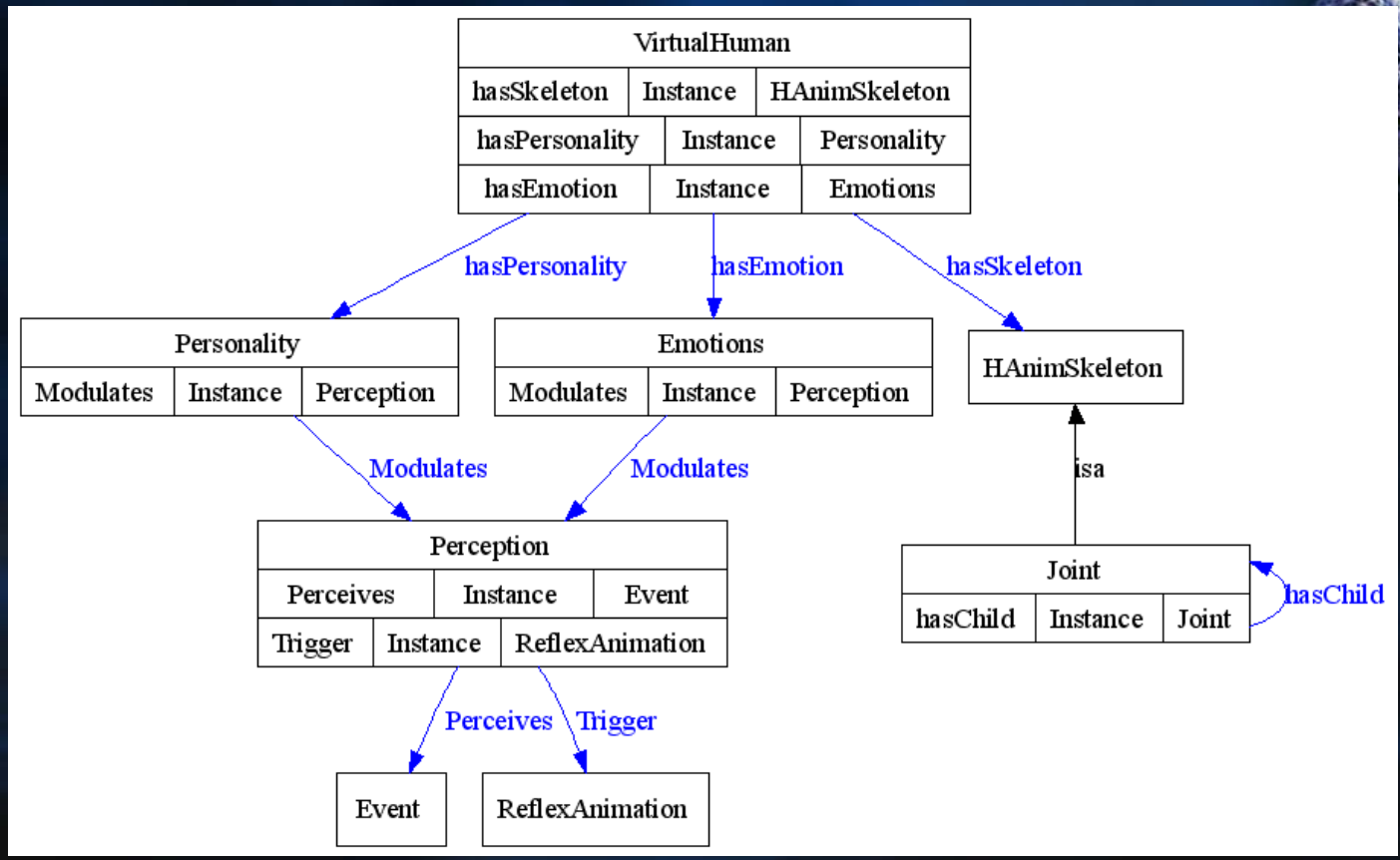


Non-verbal behaviour



Personality & Emotion (5)

- Creating ontology of movements (reflex)



Personality & Emotion (6)

- Ontology concept:
- Allow to describe animation reflex movements using personality and emotion concepts.

- Example:

VH reaction of the event “thrown ball” in different emotional states.

Personality & Emotion (7)

- How important is face and body animation?

Animation		View	% of right sequence
Face	Body		
Yes	No	Face only 	100%
Yes	No	Full-Body 	95%
No	Yes	Full-Body	66%
Yes	Yes	Full-Body	97%
Yes	Yes	Upper body 	98%

Personality & Emotion (8)

Animation		Best representation of happy emotion
Facial	Body	
Happy	Happy	83%
	Sad	2%
No difference		15%

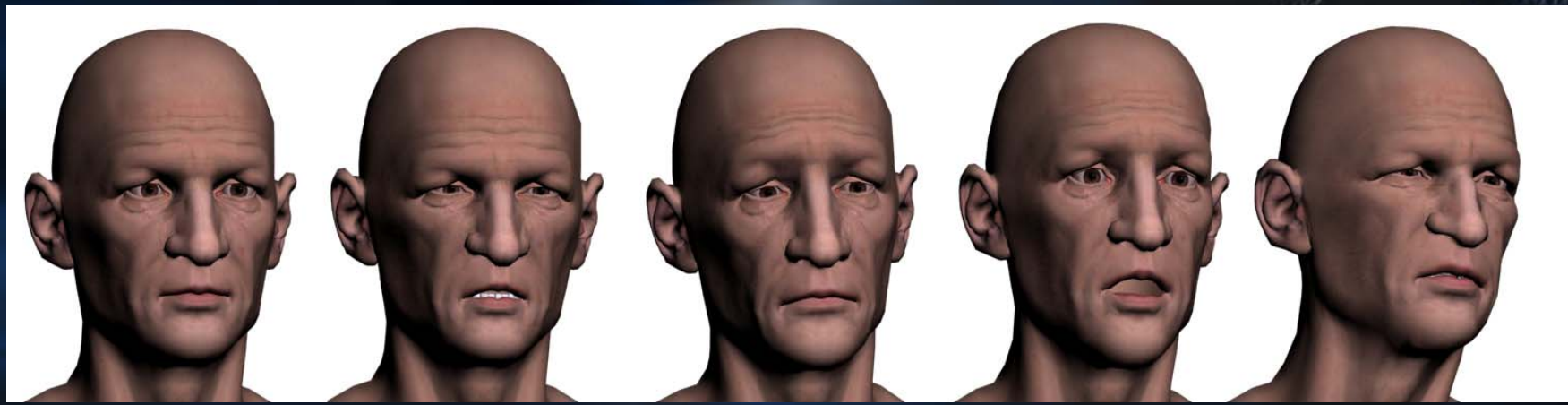
Animation		Best representation of sad emotion
Facial	Body	
Sad	Happy	28%
	Sad	52%
No difference		20%

Face / body animation influences…

Facial animation	Body animation	Degree of Credibility (1-5)
yes	no	1.85
no	yes	3.09
yes	yes	3.03

Facial Animation

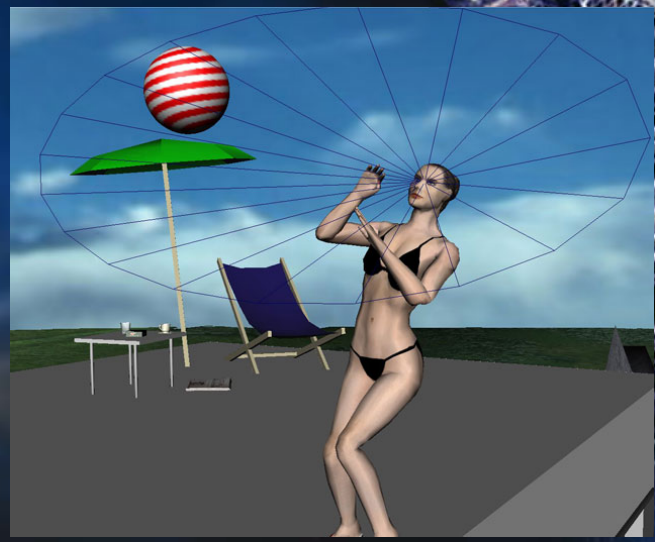
- Ekman's facial expressions on MPEG-4 face
- Synchrony with speech

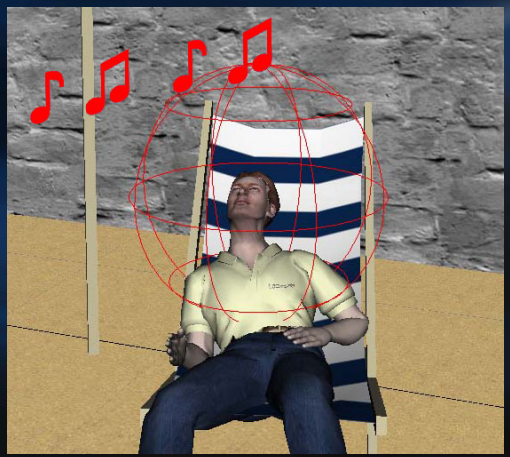


Body Animation (1)

Why affective body animation?

- Make Virtual Humans react naturally
- Enhance believability of VH
- Have individualized reactions



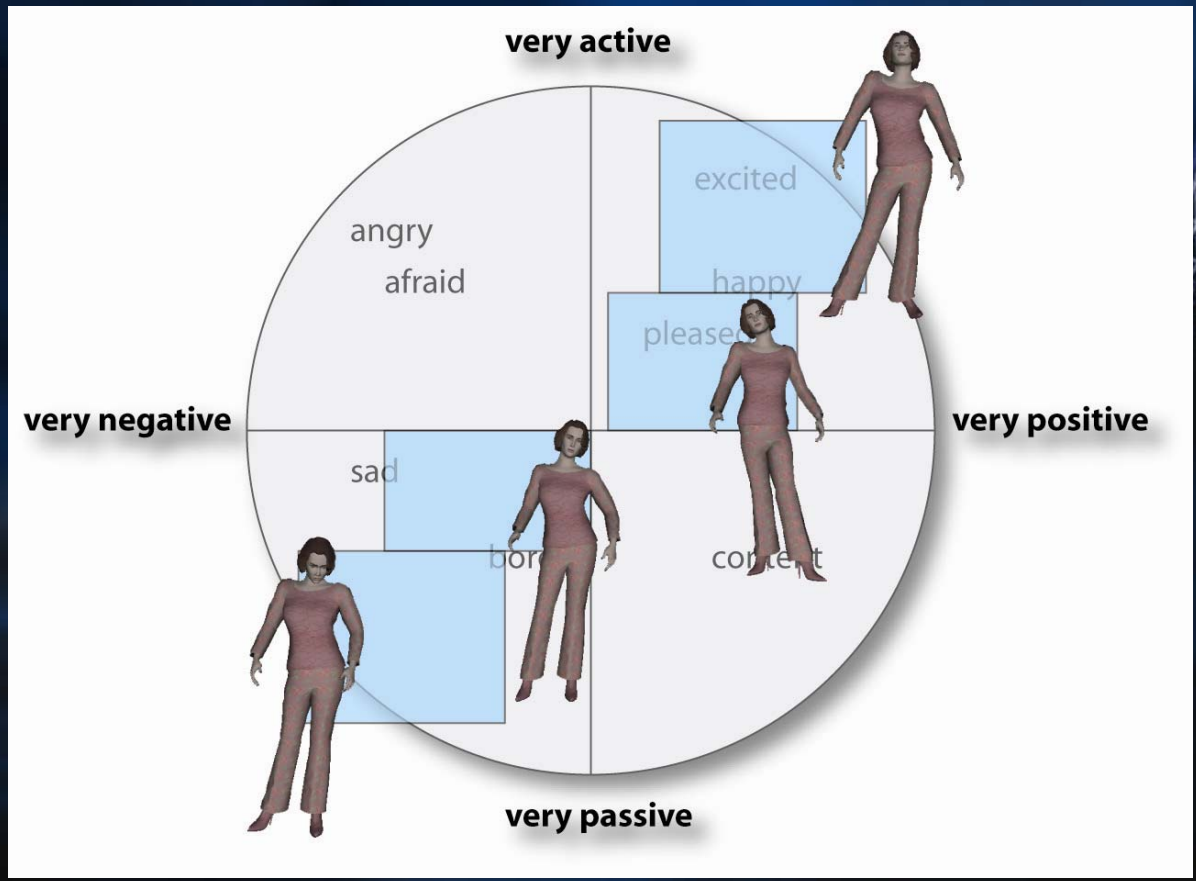


Body Animation (2)

Idle Motions are made up of balance shifts, small posture variations and supplemental idle motions

Body Animation (3)

Adding emotions to idle motions

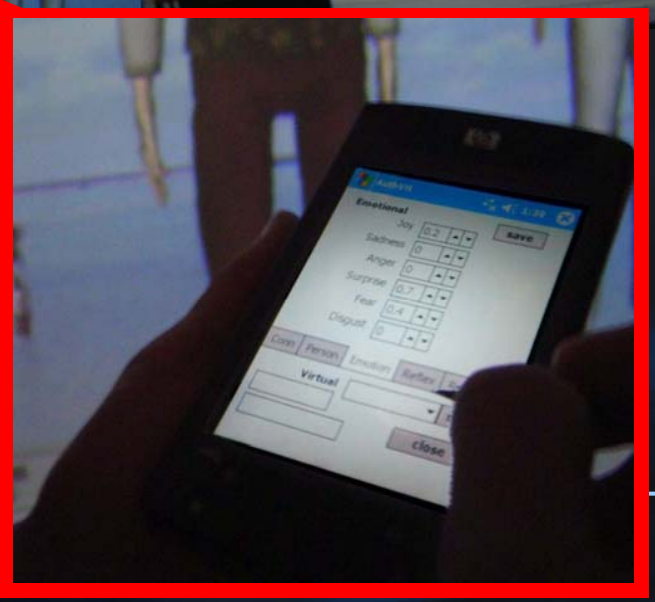


Body Animation (4)

Realistic gesture motions

Body Animation (5)

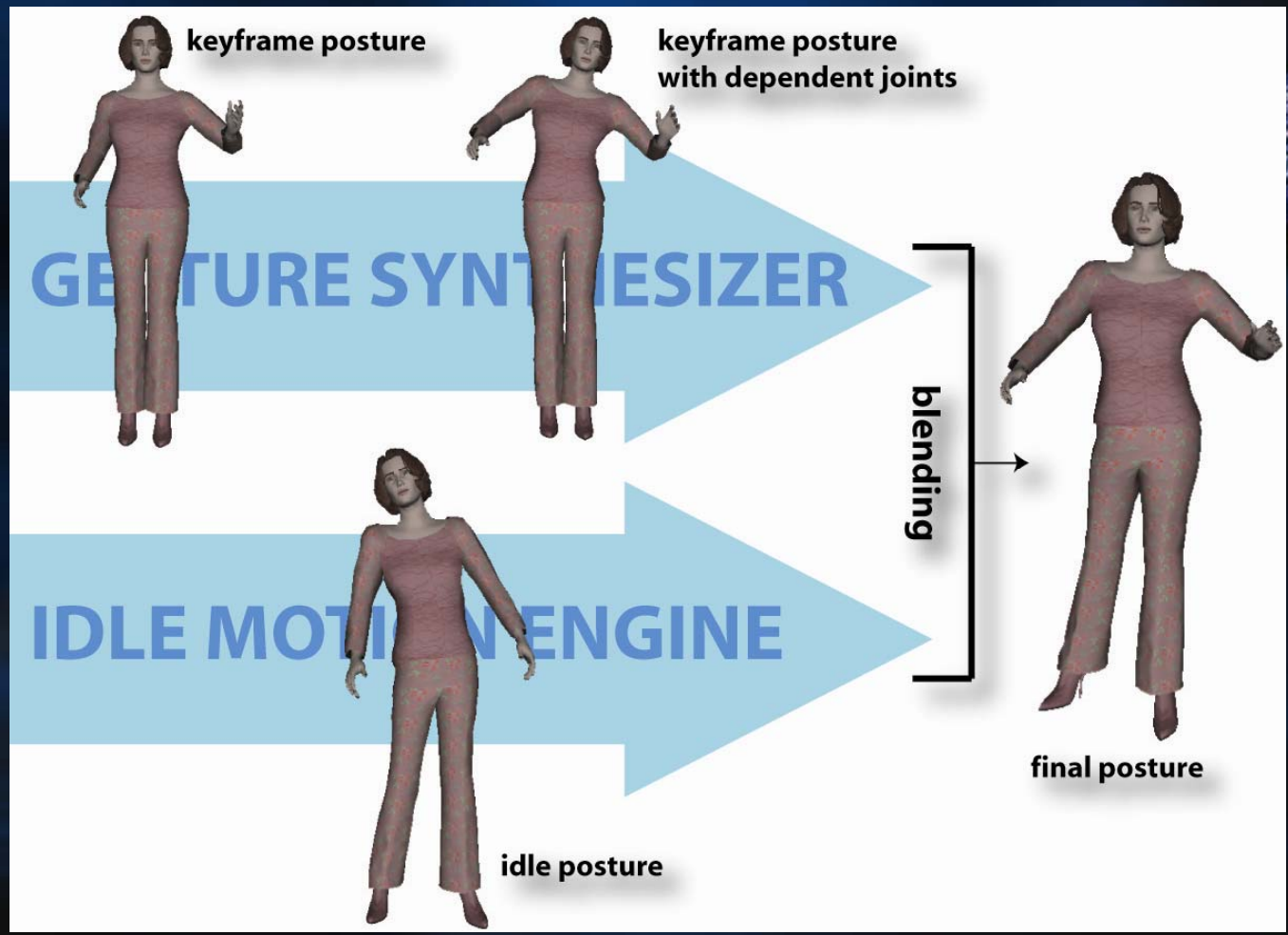
Reflex movements



Why reflex movements:

- Reflex are not considered in behavioral animations
- Repetitive sequences
- Robotic performances

Blending & Integration



Conclusions

- Face & body are both important for perceiving emotions and for realism of motion
- For the animation system, reflex motions need to be treated differently
- How can an ECA generate all these different movements? → motion planning problem
- Using an ontology helps to establish a clearer relationship between emotions and motions