



deLearyous : Training of interpersonal communication skills by natural language interaction with an autonomous virtual character

Koen Eneman¹, Jeroen Wauters¹, Frederik Van Broeckhoven¹,
Maarten Van Overveldt¹, Frederik Vaassen², Walter Daelemans²

¹e-Media Lab – Group T International University College Leuven

²CLiPS, University of Antwerp



- 3-year IWT-TETRA project
- From 1 January 2010 till 31 December 2012
- Project partners
 - e-Media Lab, Group T International University College Leuven
 - CLiPS research group, University of Antwerp
- Group of users : Belgacom, Cameleon Business Training, ElaN Languages, Epyc, De Hoorn, IBBT, IBM, Opikanoba, School voor de Toekomst, Synthetron, Textkernel, VITO, VRT medialab



- ❑ The aim of the deLearyous project is to create an interactive serious 3D game for the training of interpersonal communication skills in an employer-employee or customer-employee setting.
- ❑ Interpersonal communication skills are commonly trained through role playing. This requires dedicated training sessions with a professional actor, which is time consuming and expensive.



- The deLearyous application aims to
 - decrease the need for individual coaching, and hence, to reduce the training cost
 - offer trainees an interactive way to (further) develop their interpersonal communication skills on a personal basis, in a safe and virtual environment
 - provide added value to SMEs that offer communication and behavior training and that are active in the development of (serious) games



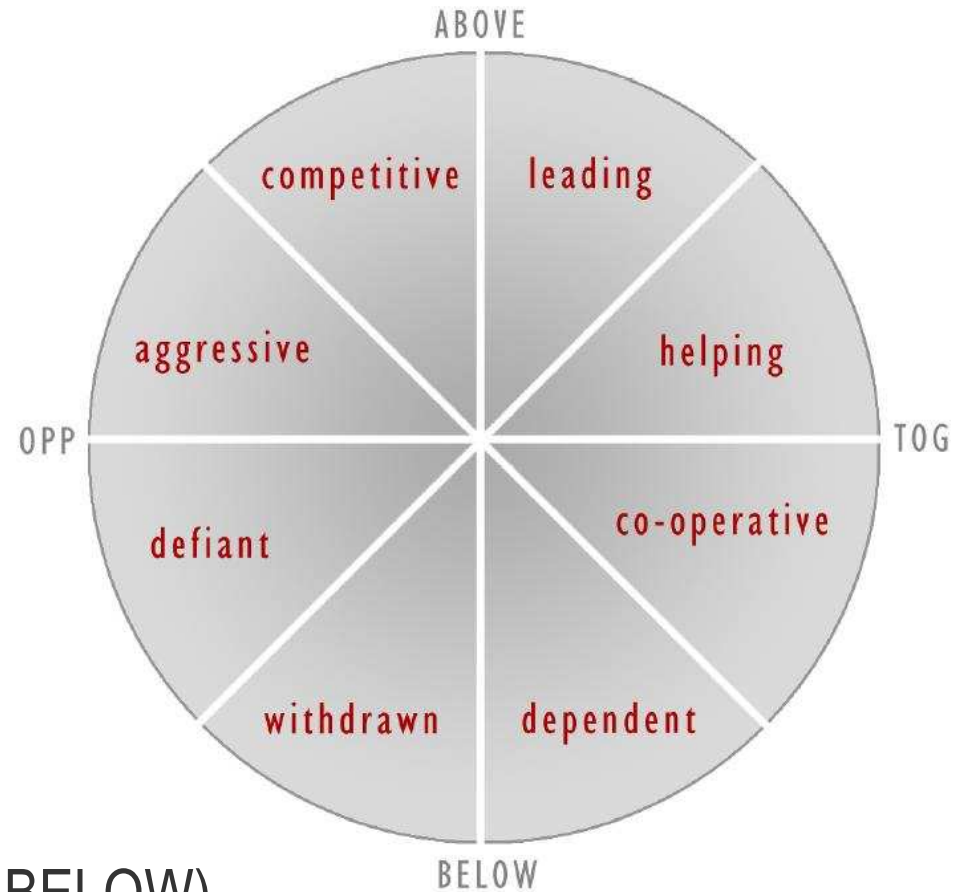
- The player interacts with the application through written natural language input and engages in conversation with an animated 3D virtual character
- Currently developed for the Dutch language
- Proof of concept
 - Developed for one representative case “The parking is no longer free”
 - player = manager
 - virtual character = dissatisfied employee
 - To be evaluated through in-the-field tests



- The virtual character's response to the player input follows a communication model known as the Interpersonal Circumplex, also called Leary's Rose.



- 8 octants
- Two main axes :
 - Dominance (vertical) :
 - above ↔ below
 - Cooperation (horizontal) :
 - opposed ↔ together
- Reaction model
 - Symmetrical (OPP ↔ TOG)
 - Complementary (ABOVE ↔ BELOW)



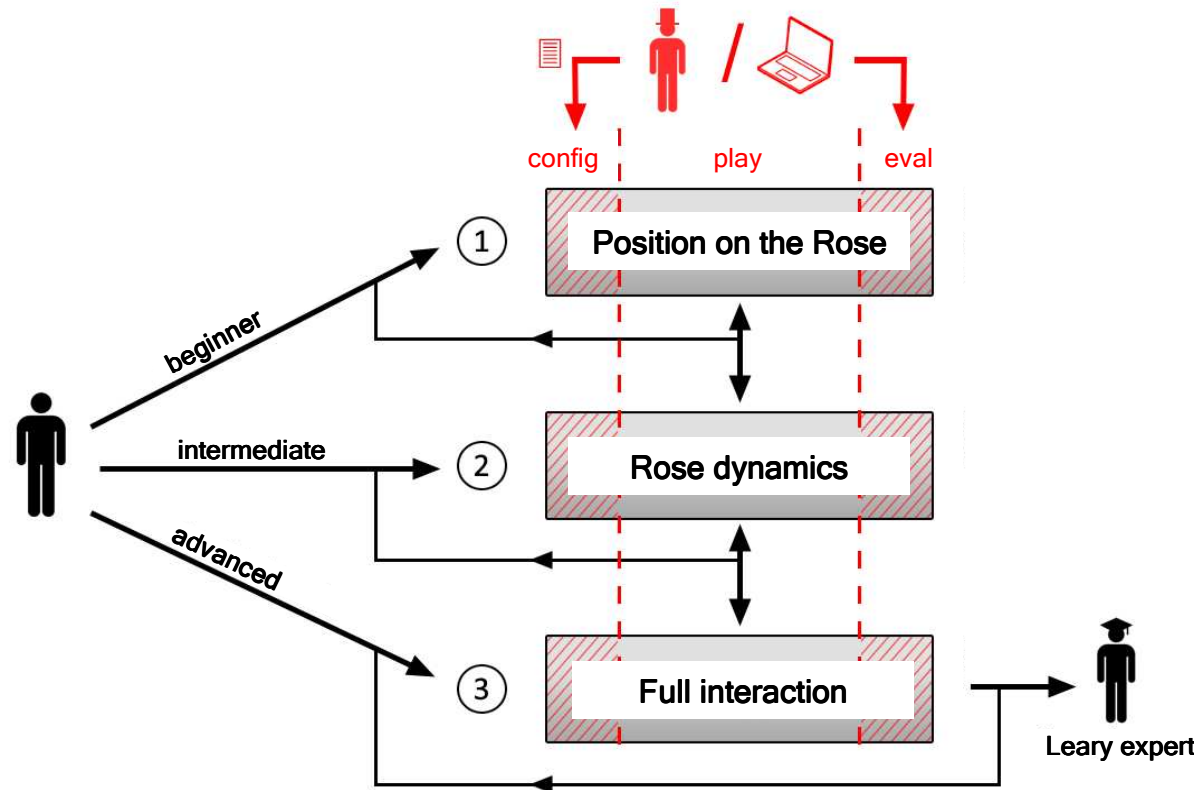


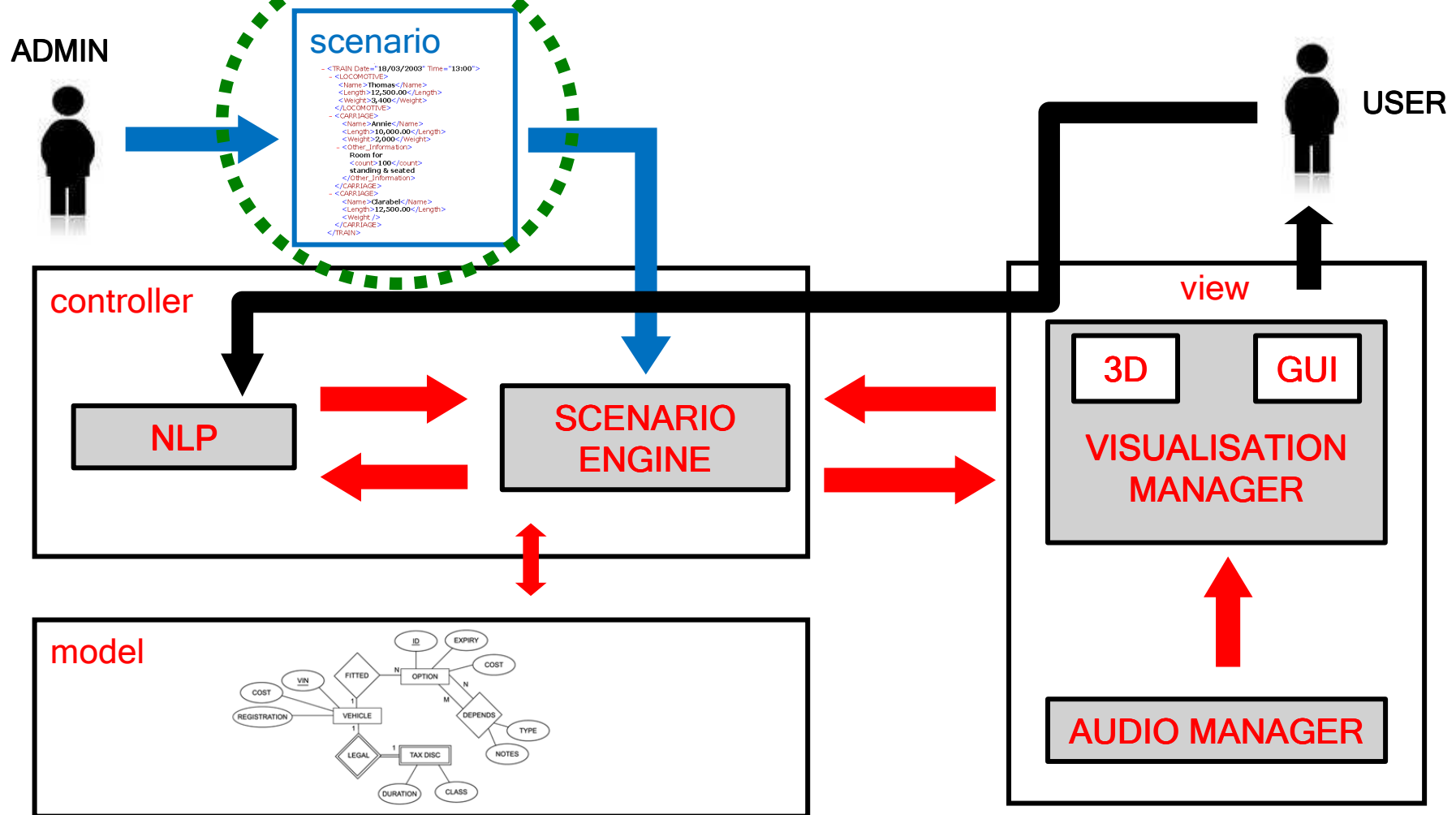
- According to Leary's model each participant in the conversation can be mapped onto the Rose given his or her state of mind (is the speaker co-operative or aggressive, dominant or submissive, etc ?).
- With a thorough understanding of the Interpersonal Circumplex and the reaction model, the player can alter the opponent's, i.e. the virtual character's position on the Rose so to make it more favorable to his goals.

Main learning objective

deLearyous

- Understanding and practical application of the Interpersonal Circumplex (Leary's Rose) and the corresponding reaction model :

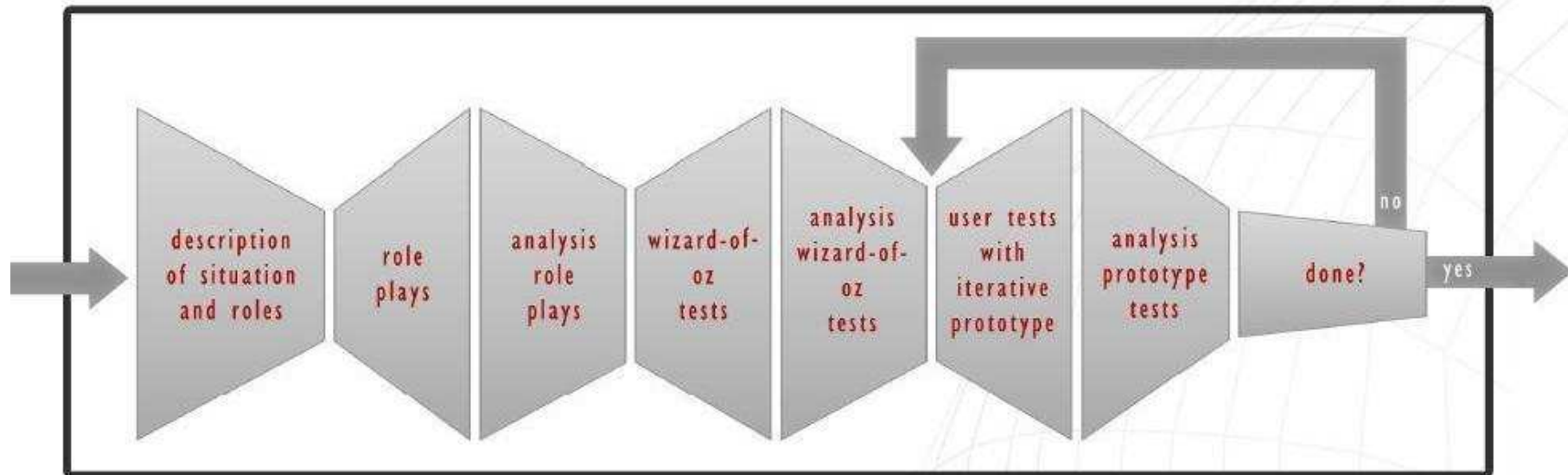






□ Scenario

- is constructed through an iterative series of increasingly specific user tests :





□ Scenario

- is constructed through an iterative series of increasingly specific user tests
- contains possible statements of the user (manager) and the virtual character (dissatisfied employee)
- is stored in XML file
 - all setting-specific information is kept outside the application
 - XML code can be easily edited
 - new scenarios can be easily plugged in and tailored to the needs of the user



□ XML code example : possible statement of the virtual character (dissatisfied employee)

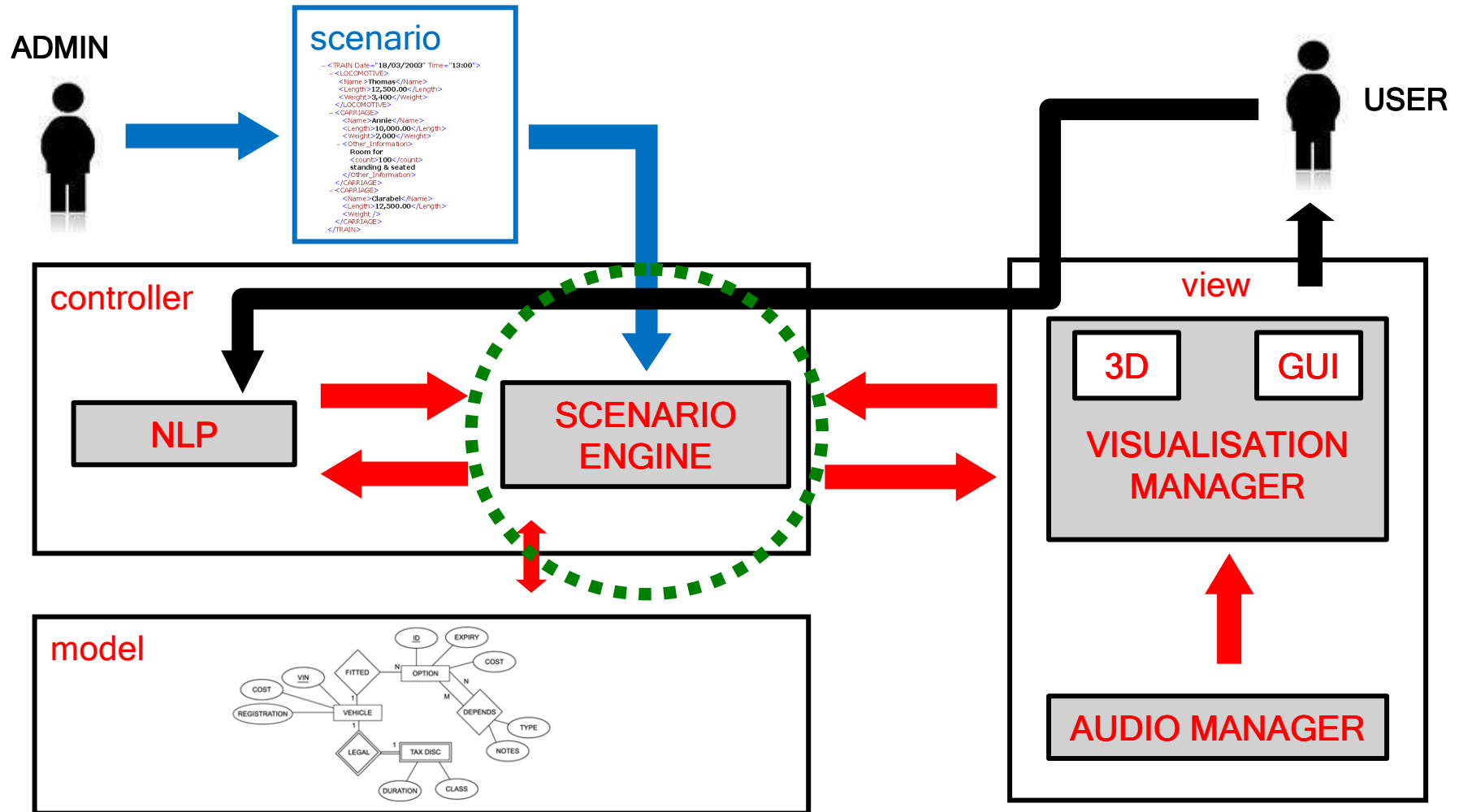
```
<VGP_statement id="s006" >
  <title>Ik heb de auto nodig voor het werk.</title>
  <octants>
    <leading>Ik kan mijn werk niet doen zonder mijn auto.</leading>
    <helping>Ik vrees dat ik mijn klanten niet kan bezoeken zonder auto, geen auto maakt mijn werk bijna onmogelijk.</helping>
    <co-operative>Ik wil me wel aanpassen, maar ik kan mijn klanten niet bezoeken zonder auto.</co-operative>
    <dependent>Ik begrijp je... Maar mijn klanten zitten soms op het platteland ik moet toch naar hun toe kunnen rijden.</dependent>
    <withdrawn>Ik zie niet goed hoe ik dan mijn klanten bezoek, zonder auto</withdrawn>
    <defiant>Super, ik zal mijn klanten dan al maar verwittigen dat ze vanaf nu steeds naar hier moeten komen.</defiant>
    <aggressive>Gebruik je verstand! Ik ben bijna elke dag onderweg naar klanten!</aggressive>
    <competitive>In jouw positie moet je toch weten dat ik elke dag onderweg ben naar klanten, ik kan niet zonder auto.</competitive>
  </octants>
  <links>
    <link tgt="s005" prob="low"></link>
    <link tgt="s007" prob="low"></link>
    <link tgt="s014" prob="low"></link>
    <link tgt="s015" prob="low"></link>
    <link tgt="s021" prob="low"></link>
    <link tgt="s025" prob="low"></link>
    <link tgt="s026" prob="low"></link>
  </links>
</VGP_statement>
```




Natural language processing

deLearyous

- Analyze the text input from the player to determine and map the state of mind of the player onto the scenario :
 - Topic detection : what does the player want to say ?
 - Automatic emotion classification : estimate the position of the player on Leary's Rose





□ Given

- the estimated position of the player on Leary's Rose
- the mapping of his last statement onto the given scenario

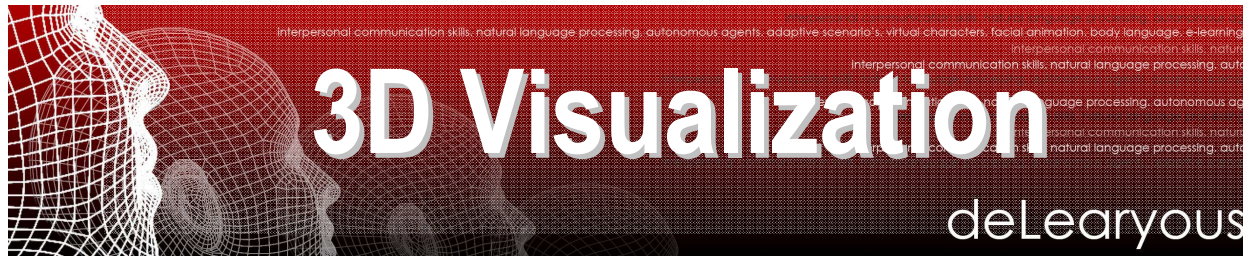
the scenario engine decides about how the virtual character will reply, i.e. how the game continues :

- what will the virtual character say ?
- with which emotional state (which octant) ?

- This is achieved by linking/inputting the scenario into a finite state machine and feeding it with the information coming from the natural language processing module.



- ❑ Select the appropriate audio file from an internal prerecorded data base, given the input from the scenario engine (desired response + emotional state of the virtual character)
- ❑ Perform phoneme analysis for the lip synching animation
- ❑ Play back the audio file



□ Rendering of a 3D representation of the virtual character

- Poses and body animation
- Facial animation
- Lip synching animation

given the position of the virtual character on Leary's Rose and the audio file that is played back.

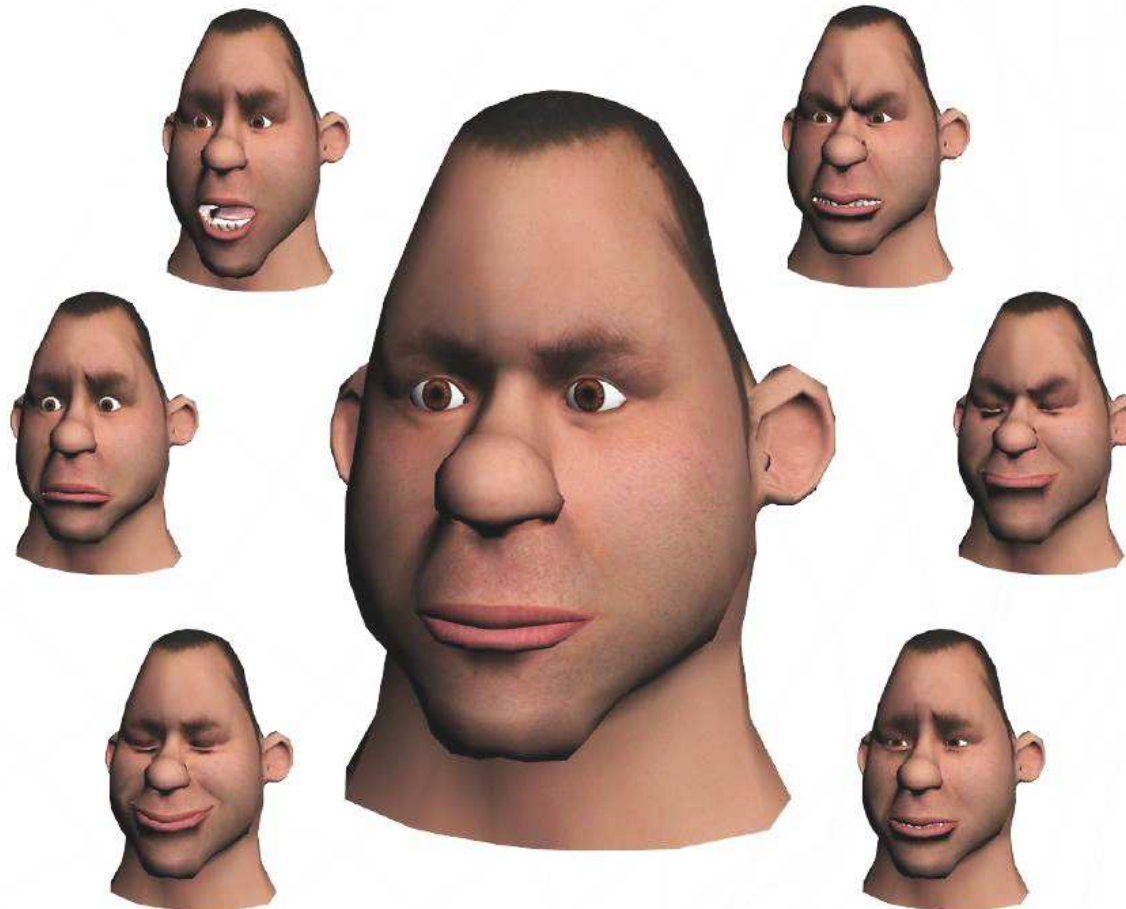
interpersonal communication skills, natural language processing, autonomous agents, adaptive scenarios, virtual characters, facial animation, body language, e-learning

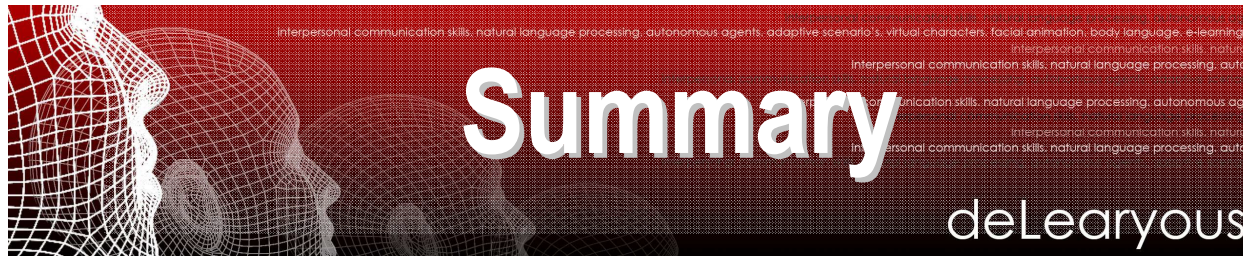
3D Visualization

deLearyous



COMPUTATIONAL LINGUISTICS & PSYCHOLINGUISTICS RESEARCH CENTER / **CLiPS**





□ Project characteristics / innovation :

- Interactive serious 3D game for the training of interpersonal communication skills in an employer-employee or customer-employee setting
- Learning process based on the Interpersonal Circumplex model (Leary's Rose)
- Natural interaction with a virtual character :
 - Natural Language Processing : interpretation of text input + mapping of the emotional state of the trainee on Leary's Rose
 - Intelligent scenario engine using Leary's reaction model
 - Realistic audiovisual feedback to the user through facial and body animation of the virtual character
- New scenarios can be easily plugged in into the application



<http://delearyous.groept.be/>

koen.eneman@groept.be