- PROJET FINANCÉ PAR L'ANR - PROJECT FUNDED BY THE ANR
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The Acorformed Corpus: Investigating Multimodality in Human-Human and Human-Virtual Patient Interactions

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Context & General goals of the project

❑ Impact of breaking bad news

- ✓ Disease evolution
- ✓ Adherence with treatment recommendation
- ✓ Side effects of the medication
- ✓ Survival probability

- ➢ **Current training: Workshop simulation with actors**

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❑ Goal of the project: training doctors with virtual patient

- ➢ **« Natural » interaction**
  - ✓ Real situation
  - ✓ Natural language interaction
  - ✓ Multi-modality

- ➢ **Behavioral measures of *performance***

- ➢ **Different degrees of *immersion***

Corpus-based approach

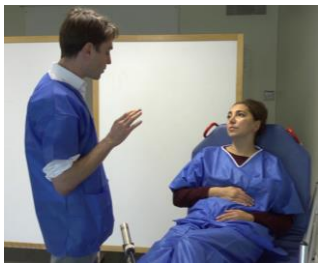
- Classical approach to construct virtual agent's behavioral model

Human-Human Corpus → Behavioral model of virtual agent → Implementation in Virtual agent → Perceptive studies

- Proposed approach

Human-Human Corpus → Behavioral model of virtual agent → *Semi-autonomous Virtual agent* → Perceptive studies

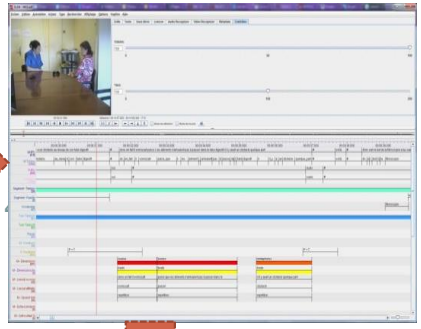
Human-Machine corpus



Perceptive studies ← *Autonomous Virtual Agent*

Corpus of doctor-patient interaction

1



2

Semi-autonomous **virtual reality training platform**

+

Autonomous **virtual reality training platform**

4

3

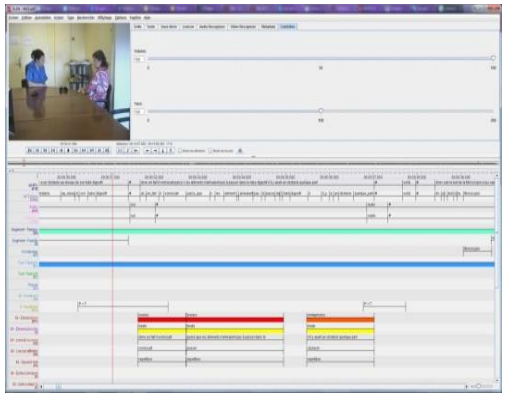
Corpus of human-machine interaction with different devices

Collect, annotation and transcription of the human-human corpus

✓ *French audiovisual corpus of doctors training to break bad news to patients*

- 2 hours of corpus of doctors training sessions in medical institutions
  (13 videos – different pairs doctors-actors)
- Actors-patients : « Standardized patients »

Corpus in Ortolang part of CLARIN infrastructure



✓ *POS tagging*

- **Morphosyntactic categories** (focus on adj, verbs, nouns)
  Marsatag Tool, LPL

✓ *Manual annotation*

- ***Manual transcription of the*** corpus
- 3 annotators (paid students in linguistics)
- Each annotator: annotation of 1/3 of the corpus
- Definition of a *coding scheme* & annotators supervision
- **Annotation of non-verbal signals of doctors and patient**

Modality	Values
Head movements	nod, shake (negation), tilt, bottom, up, side
Posture change (movements of the bust)	forward, backwards, other change
Gaze direction	oneself, interlocutor, other direction, closed eyes
Eyebrow expression	frown, raise
Hand gesture	movement[4]
Smile	smile, no smile[5]

Category	Number of annotations	
	doctors	patients
Head	3649	1970
Hands	635	463
Gaze	1823	716
Smile	20	20
Eyebrows	225	189
Posture	239	257
Words	44816	16727

5% of the corpus annotated by one more annotator
Inter-coder agreement with Cohen's Kappa K=0.63

Corpus of doctor-patient interaction

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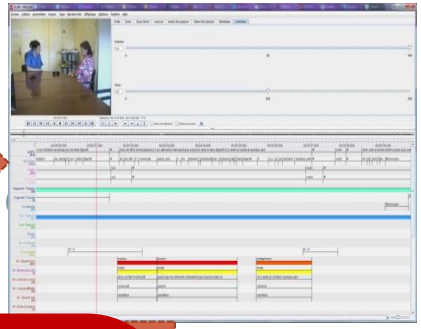

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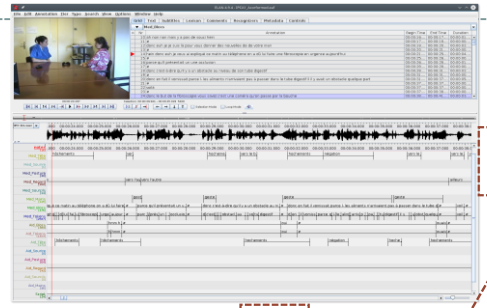
Corpus of human-machine interaction with different devices

Verbal and non-verbal behavior models of the virtual patient

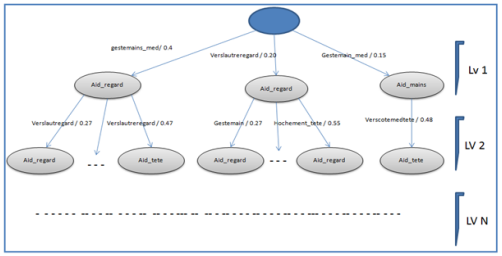


Lexicon of generic non-verbal behavior + 16 context specific gestures

Dialog model based on a « common ground »

OpenDial

Feedbacks model



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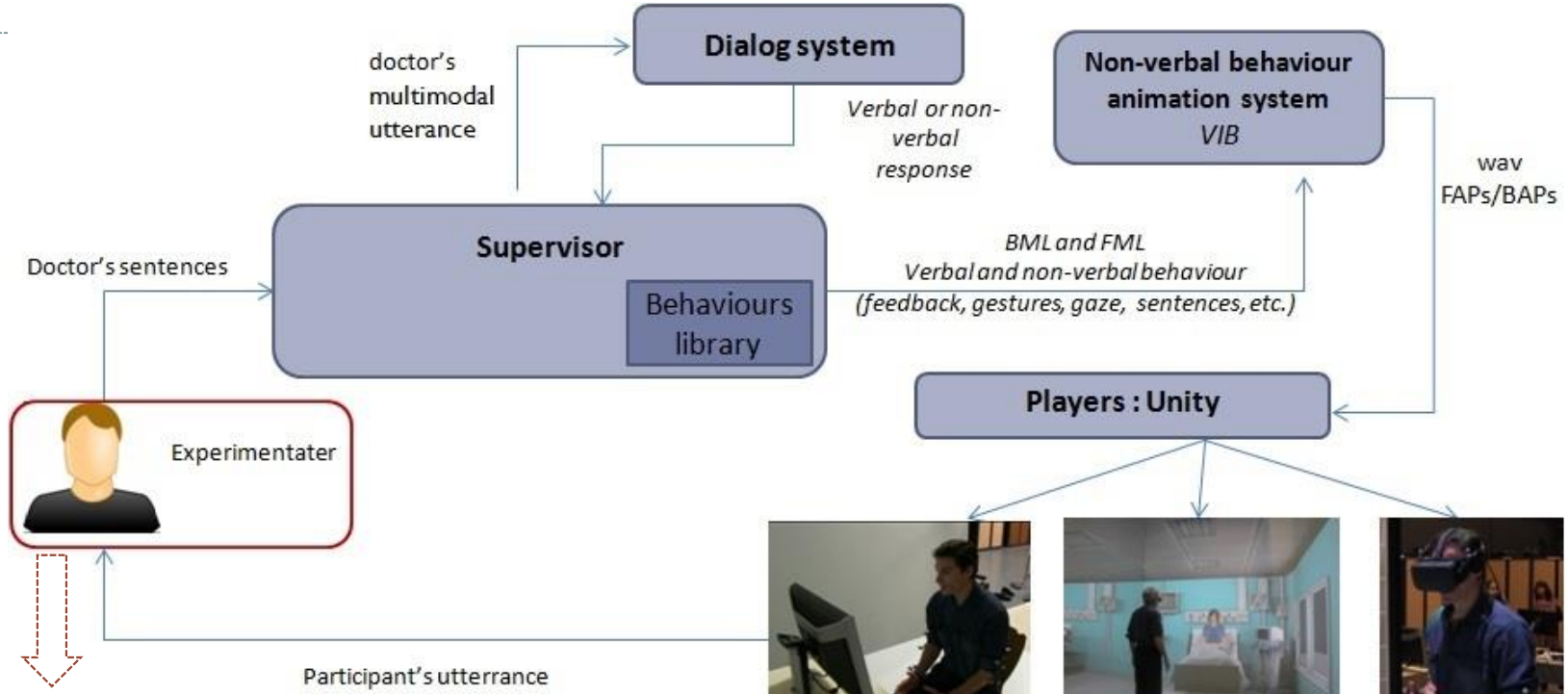
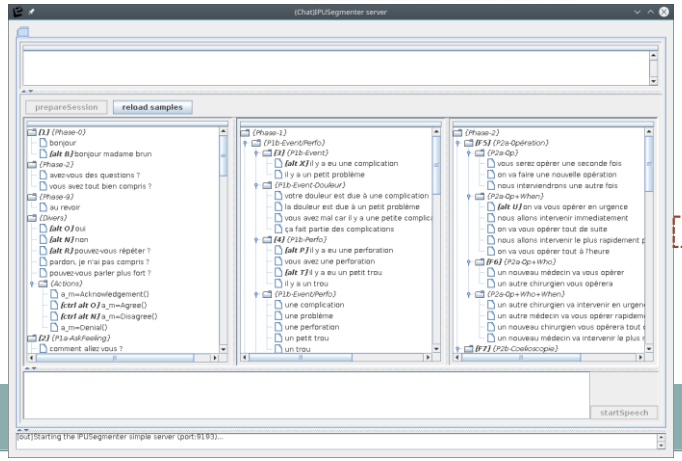
Semi-autonomomous system





Experimentator selects the sentence pronounced by the doctor ≠ Wizard of oz

Corpus of doctor-patient interaction

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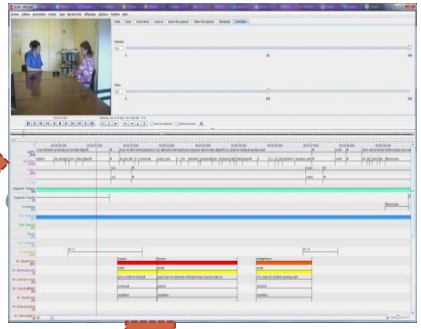

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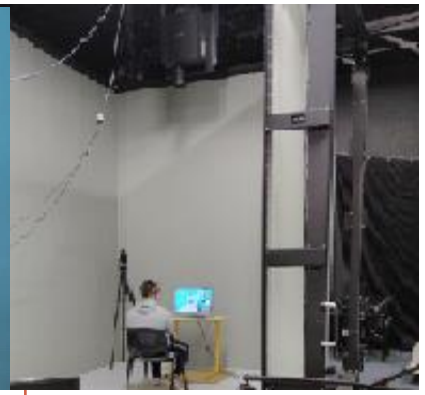
Corpus of human-machine interaction with different devices

Human-Machine Interaction Corpus

Users: 26 naives +10 experts

Task
Announce of a digestive perforation





Each user interacts with three virtual reality displays

Post-questionnaires experience
- *Presence* questionnaire: IPQ (Shubert, 2003)
- *Social presence* questionnaire (Bailenson et al., 2005)

- **Human-machine corpus : *108 interactions – 5h30***
  - Automatic annotation of the non-verbal behavior (tracked target on head, hand, and arms)
  - Videos « tagged » with a level of subjective presence (engagement)

Analysis of the human-machine corpus

3D Video Playbackplayer
A tool to replay the human-machine interaction

Corpus of doctor-patient interaction

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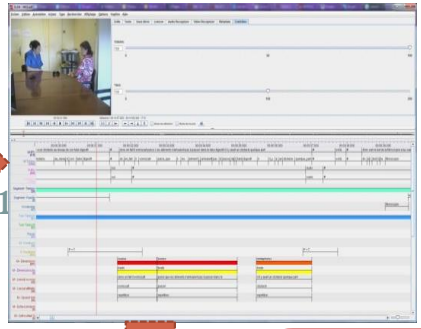

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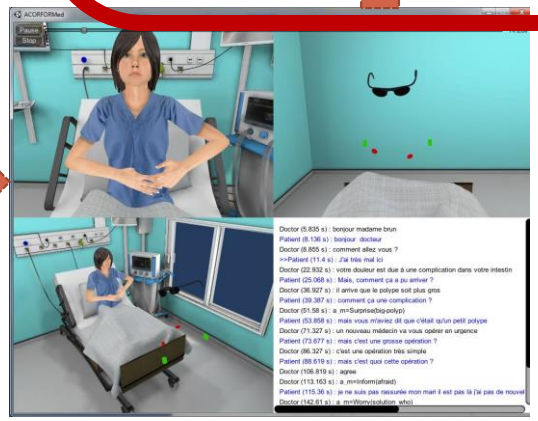
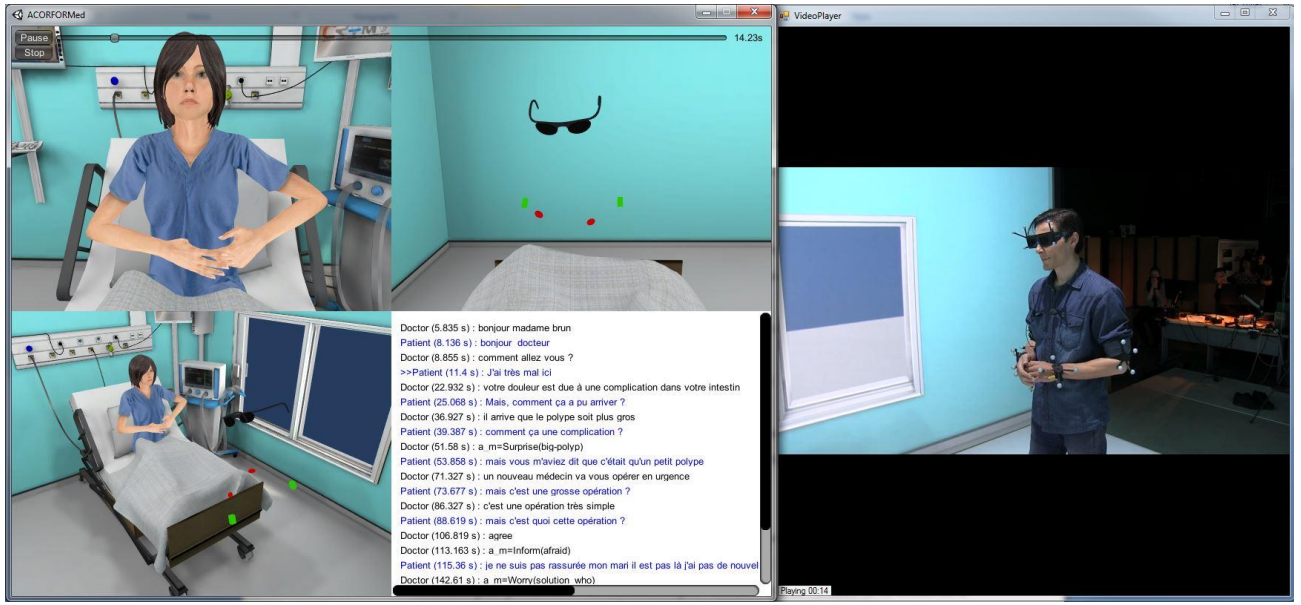
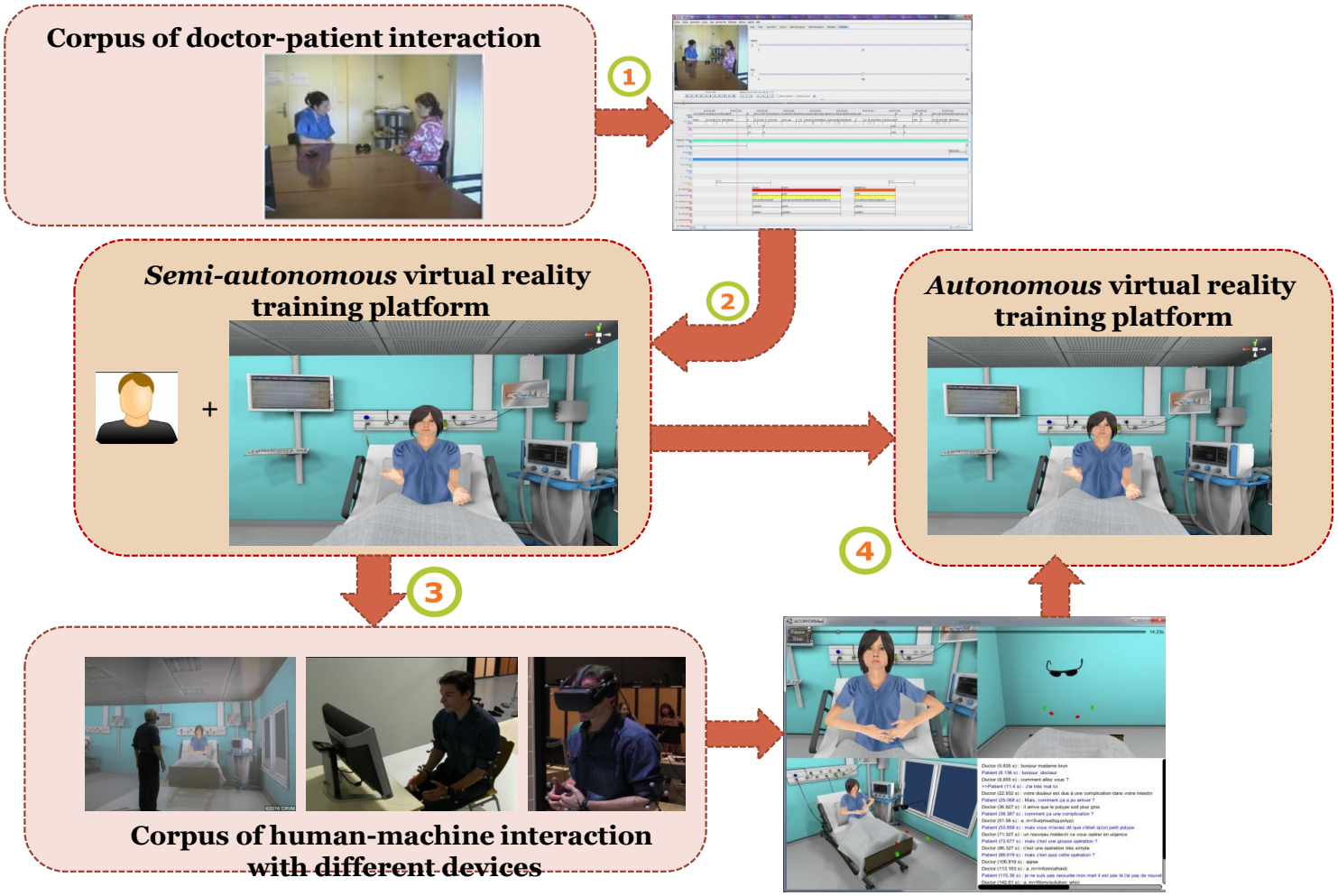


Analysis of the human-machine corpus



- Questionnaires responses analysis to evaluate the experience of the users with the system: *presence and copresence*
- Corpus used to train *the speech recognition system*
- Corpus exploited to fine tuned *the dialog model*

➢ Machine learning methods applied on the corpus to identify *the verbal and non-verbal signals reflecting user's engagement* (HAI 2018)



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