

Interactive Narration with a Child: Avatar versus Human in Video-Conference

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1. Context and Concepts

The omnipresence of screens in everyday life has resulted in a huge growth of child-computer interaction.

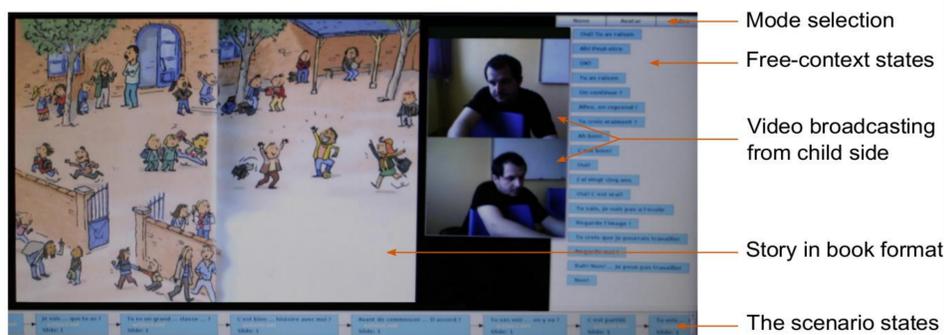
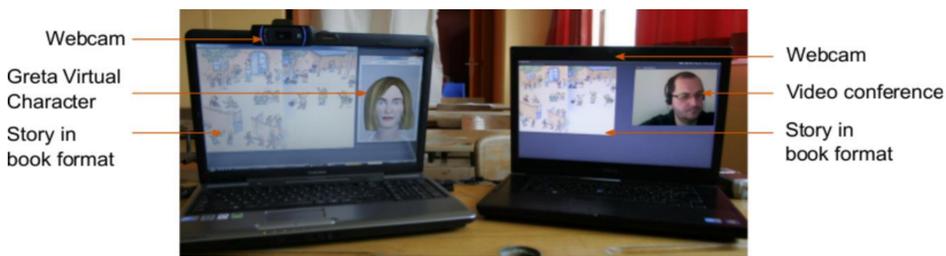
- Issues**
- characteristics of child-agent interaction, compared with child-adult interaction received little attention in scientific studies ,
 - such knowledge may be crucial to design specific applications.

- This work**
- Discusses observed data collected in an interactive storytelling environment.
 - Exploits a narrative platform in a “Wizard-of-Oz” (WoZ) configuration where children are stimulated to interact with a virtual character during storytelling.
 - Compares the level of children’s engagement in interaction regarding two types of narrator: a virtual character and an adult in video-conference mode.

2. Experimental Set-up: a narrative platform

OAK (Online Annotation Kit):

- Extends the SEMAINE Platform (a component-based communication system).
- Includes a video-conference system.
- Enables to see the child’s activity.
- Allows pilot to interact with child either via video or by piloting an avatar.
- Provides two different views : User view and Pilot view.



3. A scenario for interactive narration with children

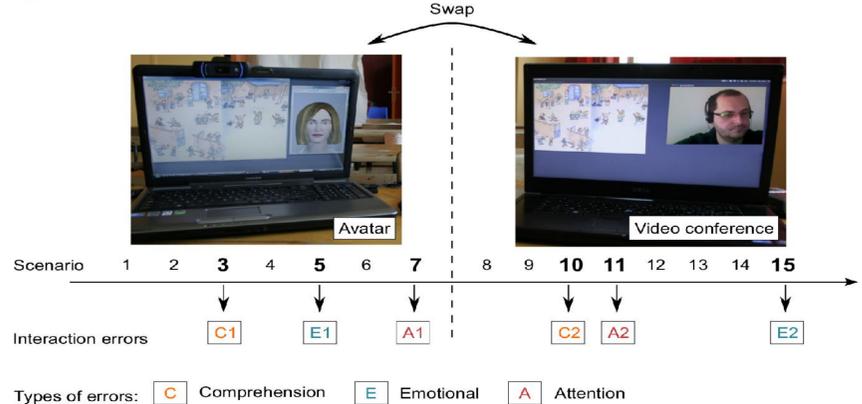
- Story**
- “The lost ball” Describes a school boy who plays with his ball before class.
- Ball is stuck on the roof and the boy and his friends try to recover the ball by throwing a boot, a school bag and a scarf.
 - Class begins but the ball along with various objects are still on the roof.
 - During the class, a huge storm blows all the things off the roof, enabling their recovery.

- Scenario**
- The narration is constructed as a sequential scenario.
 - Several branches opened with questions to give the illusion of an open story.
 - To manage the unpredictable dialogues and to force the interaction to focus back on the story, a set of context-free utterances are added.
e.g., “OK”, “You are right”, “Shall we continue?”
 - Several communicative “errors” are included in the scenario to generate more interactive sessions.
 - to assess the child’s attention (A1 and A2)
 - emotional understanding (E1 and E2)
 - comprehension (C1 and C2)

C1: “the boy throws his carrot on the roof”, instead of saying boot.
E2: “oh, look at the teacher. Is he singing?” while he is shouting at the children.
A1: Display a black screen during 3s, while the narrator is describing the scene.

Narrative Storytelling

- The story is split into two parts, narrated by different actors:
- Poppy character from Greta toolkit in WoZ configuration, or
 - Female psychologist in video-conference mode.
- During experiments, the order of the narrators is counter-balanced.



4. Examples of interaction

- Standard scenario with two narrative choices**
- oak: Oh! no! He had thrown his carrot on the roof!
oak: Ummm ... I’m not sure ... this is called a carrot, right?
child: No. It’s a boot
oak: [In case of a valid given by the child] Ah! Yes! You’re right, this is a boot!
oak: [In case of no/invalid answer] Something’s wrong. I think this is a boot.

An out-of-context answer from the narrator

- oak: And the bell rings the end of the playtime.
child: But the boot is on the roof!
oak: [Out of context answer] True! You’re right!

5. Experimental study

Method and material

20 children (6 to 8 years old, with an average of 7.7 years) have participated in the study. For each child the experiment lasts approximately 20 minutes. 90% were familiar with animated virtual characters and 60% with occasional web-cam usage. During the narration sessions, each child interacted with the avatar and the adult in video-conference.

Results

	Words	Phrases	Lengths	Ctx	Disf.	Pauses	Latency	EM	SVR	ERVQ
Video-conf	62.7	20.9	2.9	5.9	7.7	0.5	1955	11	8	19
Avatar	74.8	22.0	3.1	6.5	6	2.5	2182	4	17	14

- Children are able to adapt to a virtual character and engage in the interaction: the number of children’s interventions with the avatar does not statistically differ from the video-conference mode.
- A less hesitant, clearer and more assured speech from the children toward the avatar, confirmed by the disfluency rate measures.

	Words	Phrases	Lengths	Ctx	Disf.	Pauses	Latency
t	0.883	0.846	0.445	0.653	1.153	1.775	-0.741
p	0.681 >.05	0.359 >.05	0.881 >.05	0.545 >.05	0.277 <.05	0.076 >.05	0.468 >.05

- However, the communication with the avatar appears
 - more spontaneous ($h^2 = 0.02$, $p = 0.362 > .05$),
 - more verbal (significant, $p = 0.014 < .05$), and does not seem as natural as with the human, as they try to adapt their discourse to their interlocutor.

- ✓ Verbal modality is preferred with the avatar suggests that this modality is of particular importance for multi-modal interactive systems.
- ✓ Transcription remains one of the biggest problems in ECAs.

6. Acknowledgements

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