

Interaction Design and Field Study of a Forgetful Social Robot, "Talking-Bones"

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ABSTRACT

This paper presents an overview of Talking-Bones where the robot aims to communicate with humans in a conversation recalling together. Talking-Bones exhibits encouraging behaviors by forgetting some words in a story and asking humans to help to recall the words together in order to continue telling the story. In our field work, we observed that people found the forgotten words together and enjoyed teaching the robot often laughing and smiling. From this exercise in Joint-Remembering, we suggest that Talking-Bones has the ability to bring out helping behaviours and facilitate communication. In this paper we describe the concept of Talking-Bones and details of the robot design. Also, we describe part of the observed interaction.

CCS CONCEPTS

• **Human-centered computing** → **Field studies**; *Interaction design theory, concepts and paradigms*.

KEYWORDS

Human-Robot Interaction; Joint-Remembering; and Storytelling

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1 INTRODUCTION

While we talk to someone, we sometimes forget the person's name, terms or items about the topic. We can try to recall them by ourselves or we can ask help from our conversation partners. Speaker can ask hearers to help them remember by saying "What's his name?" or "and then what comes?" Edwards and Middleton focused on the phenomenon as Request for Mnemonic Help in their study of communication in Joint-Remembering[1]. Gurrin et al proposed a model of Robotic Digital Memory that aimed to increase a more life-like appearance in agents and a more natural response to

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Figure 1: Talking-Bones told stories to children.

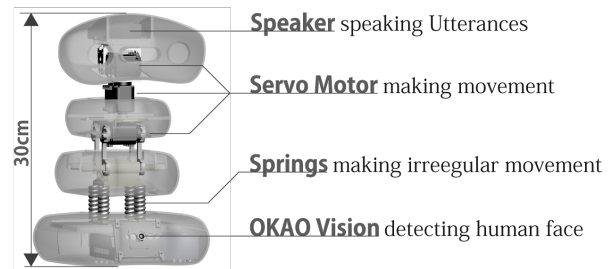


Figure 2: The components of Talking-Bones.

humans[2]. In this paper, we focus on how human and robot can communication focusing on forgotten words in Joint-Remembering.

We developed a robot we called Talking-Bones. The robot tells a story but forgets some words and it asks for human to help to remember the components in a Join-Remembering exercise. We took a constructive approach to reveal the interaction and explore the process and necessary functions for the communication in the exercise. In this paper we discuss the concept of Talking-Bones, details of the robot's behavior, and its design. Also, we describe our findings and interaction of Talking-Bones from our fieldwork.

2 DESIGNING OF TALKING-BONES

Talking-Bones has a simple design, consisting only of a rounded head and three torso (Fig. 2). We designed the robot simply to carry out limited functions and did not intend to make it more human in appearance. One of the reasons is reducing Adaptation Gap[3]. The robot was designed to keep an eye on the children when it was placed on a tabletop. Fig. 2 shows the components of the robot.

01 :T-B	aka dayo(0.4)[aka	
	That's ba... ba... ((The correct answer is "aka-chan." It means baby.))	
02 :ChX	[aka?]	
03 :Ch4	=aka[nbou](.)aka[nbou] (("akanbou" is another way to say baby.))	
04 :Ch1	[aka?]	
05 :Ch5	[aka]tarou?(0.4)akanbou jya naiyo	(Tarou is a common name for a boy.
	It's not akanbou.	Ch5 combined "aka" and "tarou" here.)
06 :Ch4	aka(.)[akatarou?][aka(.)[aka-	
07 :T-B	[aka]	
08 :Ch2	[chigau]	
	No It's wrong.	
~~~ Due to the limit of the available pages, turn was skipped ~~~		
19 :T-B	aka-chan ((Talking Bones said the forgot word))	
20 :	(0.4)	
21 :Ch4	aka-chan ka= ((Children displayed understanding))	
	It's aka-chan!	
22 :Mor	=hhhhh	

#### Structure of transcripts

00: XXX Original utterance

Transcriber's Translation

[ ] :Starting and End point of overlapping speech  
 (0.0) :Silence measured in seconds  
 (.) :Pause of less that 0.2 seconds  
 = :latch or continuing turn  
 ? :rising intonation  
 hhhh :Laugh  
 (( )) :Transcriber's comment

**Figure 3: The transcript is taken after another transcription. It was in a scene: "The baby came from a peach." The robot forgot "aka-chan"(baby). Children tried to teach it, but they could not reach the word in this interaction.**

01 :T-B	Donburako(.)to Ohkina(0.3)Etto	
	A huge well well "... " came.	
02 :	(0.3)	
03 :Mor	Momo=	
	Peach	
04 :T-B	=Nani ga [Nagare]te kitandakke?	
	What came floating down?	
05 :Ch2	[Momo ]	
	Peach	
06 :	(0.7)	
07 :ChX	Nani ga Nagarete kita?= What came?	
08 :Ch2	=Momo Peach	
09 :	(0.4)	
10 :T-B	Soreda(0.4)Soresore: Yes. That's it.	T-B: Talking-Bones Ch1: One Child(1,2,3,4,5) Mor: More than one child ChX: A child but unidentified
11 :	(0.2)	
12 :Ch4	hhhh	

**Figure 4: In this transcript the robot told a famous folk story "Momotaro". In this scene "A peach came floating down from upstream." The robot forgot the word "momo"(peach). Children taught "momo"(peach) to the robot.**

Talking-Bones could tell children basic, well-known, folk stories. When the robot talked, it would forget a part of the story (e.g. "Hmm, what comes next?"). The children would respond by making suggestions and also discussing each other (e.g. "Peach!", "What comes?"). In this way, the robot achieved the goal of storytelling with the help of its audience through the means of occasional forgetting of words. The robot tracked people and listened to their suggestions by nodding, using facial recognition, and making motions suggesting thinking, such as looking up the air.

### 3 FIELDWORK

We have demonstrated our robot, Talking-Bones, on open campus, at an event at a local city library, etc. In these field works, we observed that people tried to teach the word forgotten by the robot and enjoyed the interaction, laughing a lot. In this paper, we describe two interactions between Talking-Bones and five children.

Fig.4 showed, Talking-Bones stopped telling the story and said "Etto"(filler). Then children said "Momo"(peach) together. Children tried to teach the forgotten word. The robot told the children that it recognized the children's speech, and then children laughed.

Fig.3 showed children tried to think with each other and to teach a word together to the robot. The robot forgot the word "aka-chan"(baby). The robot said part of the forgotten word (e.g "a", "aka" from "aka-chan"). However, children taught the word "akanbou"(it's another way to express baby), Furthermore, they created a new word "akatarou" which does not exist in the story. Children then taught each other "chigu"(wrong). At the end, the robot recalled the forgotten word and said "aka-chan." The children then formulated the word as "aka-chan ka"(it was aka-chan) and they laughed.

### 4 CONCLUSION

In this paper, we described Talking-Bones, a robot that sometimes forgets words and while telling stories to people and gets their help in remembering the forgotten word. The robot aims to have triadic Joint-Remember interaction between human and robot. We illustrated observed interactions between people and the robot, especially children, from numerous field trials and demonstrated the robot and children enjoying interacting with the robot and teaching it. In our poster presentation, we will demonstrate the robot and hope to have further discussions.

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