
TalkBetter: Smartphone-supported Intervention in Family Conversation for Children with Language Delay

Inseok Hwang^{1,2}

inseok@nclab.kaist.ac.kr

Chungkuk Yoo²

ckyoo@nclab.kaist.ac.kr

Chanyou Hwang²

chanyou@nclab.kaist.ac.kr

Dongsun Yim³

sunyim@ewha.ac.kr

Youngki Lee⁴

youngkilee@smu.edu.sg

Chulhong Min²

chulhong@nclab.kaist.ac.kr

John Kim²

jjk12@kaist.edu

Junehwa Song²

junesong@nclab.kaist.ac.kr

¹Center for Mobile SW Platform, KAIST, Daejeon, Korea

²Dept. of Computer Science, KAIST, Daejeon, Korea

³Dept. of Language Pathology, Ewha Womans University, Seoul, Korea

⁴School of Information Systems, Singapore Management University, Singapore, Singapore

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Abstract

In this video, we present *TalkBetter* [3]¹, a smartphone-supported intervention care service in everyday family conversations for children with language delay. We briefly introduce the problem and risks of early language delay, and emphasize the clinical implication in stimulating the children's language in everyday family conversation. We address the challenge that the parents should change their original conversation styles into clinically desirable ones. We introduce the basic operations of TalkBetter, providing in-situ interventions at the right moments in on-going conversations. We then depict five use cases in which TalkBetter detects the unique meta-linguistic patterns in the conversation and triggers appropriate reminders to the parent.

Author Keywords

Language delay; speech-language pathology; mobile; children; parent; smartphone; conversation; turn-taking; in-situ intervention; everyday life

¹ This video accompanies a CSCW 2014 paper which includes the extended version of interdisciplinary studies on motivation, design, prototyping, and evaluation of TalkBetter



Figure 1. TalkBetter: data and service flow

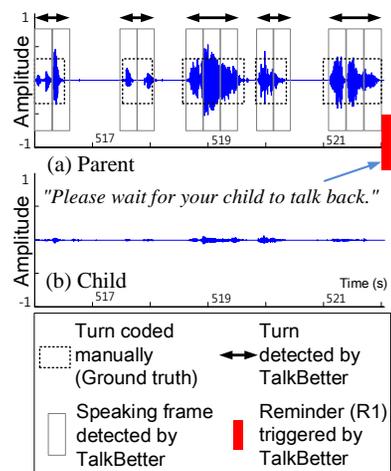


Figure 2. Meta-linguistic turn-takings monitored by the smartphone.

ACM Classification Keywords

J.3 Life and Medical Science: Health; C.3 Special Purpose and Application-based Systems: Real-time and embedded systems; H.5.3 Group and Organization Interfaces: Computer-supported cooperative work

Introduction

The human ability to communicate through language is a unique blessing which is vital to enable our social life [2]. It is little doubtful that conversation is one of the major modes of our daily social interaction. In the CSCW community, computationally augmenting conversational interactions has been a key research interest – promoting balanced participations and verbal contributions in face-to-face meetings [8][9], supporting brainstorming with pictorial stimuli [7], etc.

In this video, we introduce a new opportunity of CSCW to facilitate one's healthier social life through computational support of daily conversation. *Language delay* refers to a failure or difficulty in childhood to achieve these stages on the typical developmental timetable. Language delay acts as a critical risk factor during one's social life; it is associated with subsequent socioeconomic outcomes such as prolonged unemployment and a paucity of social relations [1]. To help children with language delay throughout their daily life and accelerate their treatment, this video presents a brief demonstration of *TalkBetter* [3], a clinically designed mobile intervention service for family conversations using a commodity smartphone.

The key idea of TalkBetter is grounded on the clinical guidance that the parents should train and stimulate their child's language through everyday family

conversations [6]. However, we observe that the parents face nontrivial challenges that they should train themselves to change their long-established conversation styles to follow many clinical guidelines at all time. TalkBetter is designed as a background smartphone service, monitoring meta-linguistic turn-takings from parent-child conversations by sensing their voice streams [5] (See Figure 1 and Figure 2). In case that the parent is likely departing from a pre-defined clinical guideline, TalkBetter gives a contextual reminder to the parent to reinforce the conversation to be more clinically favorable.

Along with the recent growth of the CSCW community's interest on social computing, facilitating socially-driven care to help those in need of social skills has been explored by harnessing remote social interactions [10]. Extending such effort, we believe that TalkBetter would be an early demonstration of socially-driven care by augmenting face-to-face conversational interactions, which are indeed prevalent in our daily social life.

Use cases

The video depicts five use cases of TalkBetter in family routines, where five different types of contextual reminders are demonstrated. The following subsections elaborate each use case. Figure 3(a)~(e) show meta-linguistic patterns of each use case.

Case 1: "Please respond to your child and show interest"

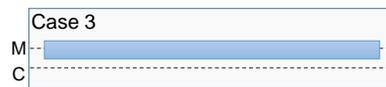
When the child has initiated talk to the parent, promptly responding to the child is very important to encourage the child to talk further. Even though parents are mostly trying to respect and respond to what their children talk, they often fail to notice that



(a) Case 1: "Please respond to your child and show interest."



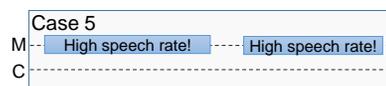
(b) Case 2: "Please wait enough for your child to talk back."



(c) Case 3: "Please speak short and simple."



(d) Case 4: "Please do not interrupt your child."



(e) Case 5: "Please talk slowly."

Figure 3. Meta-linguistic patterns of each use case.

their children has initiated talk. Being preoccupied by smartphones or televisions are common examples.

In this example, the son babbles a few times while playing with his fishing toys. Then he says "I got fishing" to his mother, but she keeps focusing on her smartphone and does not notice that her son is trying to say something. TalkBetter detects the turn-taking pattern in which only the child's turns repeat without following mother's turns. Accordingly, TalkBetter gives a gentle reminder to the mother saying *"Please respond to your child and show interest."*

Case 2: "Please wait enough for your child to talk back."

When someone talked something to a child with language delay, the child often needs longer time to comprehend what they have heard and produce their responses. Waiting for a sufficient time until the child talk back is a rule of thumb for the parents.

In this example, the mother and her son are playing with colored paper. She shows a paper she has cut out and repeatedly asks "What does it look like?" to her son without waiting long enough. Apparently the son does not respond to nor show any interest in her questions. TalkBetter detects their turn-taking patterns in which the mother's turns appear repeatedly with insufficient pauses between them, and at the same time there is no turn from the son. Based on this pattern, TalkBetter reminds the mother that she should wait enough for her child to talk back.

Case 3: "Please speak short and simple."

As a young child develops his language, he gradually becomes capable of comprehending and producing

more complex sentences. The number of words consisting of a sentence is a typical measure of such complexity. When talking to a child with language delay, it is important to keep the sentences shorter and simpler than those for normal children at the same age.

In this example, the mother and her son are playing at a playground. The son wants to play seesaw, but the mother is afraid that he might get injured. She tries to explain him that it is dangerous, but her explanation has become too long and wordy. Her son remains quiet and even hardly makes eye contact. TalkBetter detects the turn-taking patterns in which the mother's turn lasts too long and the son remains silent. TalkBetter thereby gives a reminder to the mother saying *"Please speak short and simple."*

Case 4: "Please do not interrupt your child."

Interrupting while a child is talking is clinically undesirable as it may frustrate the child's will to talk further. What is important to parents is to listen completely what the child says, and then respond him respectfully.

In this example, the mother and her son are playing with colored paper. The son babbles that "I... my..." but the mother interrupts him and asks "Shall we go out?" TalkBetter detects that the beginning of the mother's turn is temporally overlapping with the ending of the son's turn. Upon repetition of such patterns, TalkBetter infers that the mother is interrupting and gives her a gentle reminder not to interrupt her son.

Case 5: "Please talk slowly."

It is not surprising that talking in a slow speed would make it easier to understand, especially for those who

are not fluent enough in that language. Likewise, to keep talking at an appropriate speed is highly important when talking to children with language delay. However, the parents often unwantedly talk fast as they have been doing so far with normal people.

In this example, the mother and her son are taking a walk outside. The mother wants to stop by a place nearby but her son wants to keep going. Apparently the mother gets hasty; she tries to persuade him but she speaks too fast. TalkBetter estimates the speech rate from the mother by processing the verbal signals in her turns. On determining that it is too fast, TalkBetter gives a gentle reminder saying "Please talk slowly."

Conclusion

We present a new opportunity for CSCW to facilitate everyday parent-child conversations with therapeutic implications for children with language delay. As a first step, we demonstrated TalkBetter, an in-situ intervention service for parents to reinforce their clinical guidelines. For the future work, we plan to apply the core functionalities of TalkBetter to the social behavior monitoring among peer children [4].

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