

Automatic Utterance Generation for Personal Narrative – System Development and Feasibility Experiences

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Abstract

The “How was School today...?” project has successfully introduced a new personal narrative tool for children with severe speech and physical impairments. The system uses sensor data, voice recordings and other information (such as the child’s timetable) to automatically generate narrative utterances for the child to use in conversation with parents. The final prototype consists of two modules; 1) a switch accessible mobile phone: This is used for data collection and narrative sharing using voice recordings and photographs; and b) a PC based VOCA/SGD which gives access to additionally generated story utterances using the collected data and evaluations (such as “I liked it” or “She is nice”). An interface allows for editing and telling the narrative. Both modules use wireless mobile network connection for data exchange. The user centred design methods applied in collaboration with special schools will be described and the challenges and results discussed.

Extended Abstract

Introduction

Computer-based speech generating AAC devices which provide access to pre-stored words, phrases and sentences are well suited to communicate needs and wants. However, they do not support more complex interactions such as conversational narrative (*guess what happened to me today*) and social dialogue (e.g. pub chats) very well (Waller 2006). Personal narrative is a vital type of interaction for social communication. By talking about our personal experiences we translate our knowledge into a narrative (McCabe and Peterson 1991), helping us to shape our experience (Quasthoff and Nikolaus 1982).

Development of a tool to support personal narrative about school experiences

A prototype system has been developed to support children with communication disabilities to construct and tell stories about their day at school (Black et al. 2009; Reiter et al. 2009; Black et al. 2011). In general, the design of new AAC devices and technology seldom includes the users throughout the development process (Prior 2011). The “How was School today...?” system was designed in collaboration with schools; therapists, teachers, children and their parents were involved in the design from the beginning for input and feedback. During three evaluation phases we deployed the system in two schools with five children to gather information about the feasibility of such a system in real environments.

Design Stages

Several methods were used during the design of a series of prototypes (Reiter et al. 2009; Black et al. 2011):

1. Information gathering: (a) interviews were conducted and informal feedback gathered from speech and language therapist/pathologists, teachers and parents in three schools; (b) ethnographic studies were conducted in two schools over several weeks, shadowing ten students and their classes throughout their day for up to one week each to collect information about daily activities, interaction

with staff and peers and the location of the children. Specific information such as the children's timetable, lunch menu, current use of AAC equipment, literacy/symbol use and access methods were noted.

2. To address the issue of building an environment which would support the use of AAC devices to support narrative, two workshops for staff were held on supporting personal storytelling.
3. A virtual school environment was shown to staff and parents to illustrate the concept of automatic narrative generation based on collected sensor data supplying information such as location and interaction with objects.

Early user interface prototypes were deployed in the school for feedback and input from staff and children. Visual interfaces to access the generated utterances were trialled and discussed were possible with participating children to ensure sufficient access to the generated stories.

Evaluations in Real Environments

The schools' environments were tagged to track the children's location, activities, and interactions. School doors were equipped with RFID tags or 2D barcodes for use with sensors to track location. Learning tools such as personal computers, reading books and games were tagged for activity tracking and school staff received tagged staff cards for interaction tracking.

School staff, participating children and their parents used the prototypes at different stages of the design process to collect information about feasibility of data collection, story generation and use of generated stories in conversations with staff and parents.

Final Prototype and Results from Evaluations in Schools

The final system implemented consists of a modular structure to allow for easy and extended data collection. The system is divided into two components: (a) A data collection device which is small and easy to keep with the user at all times implemented on a mobile phone and (b) the story narration interface which runs as an application on the user's PC based high-tech VOCA/SGD.

The mobile phone prototype allows for recording voice messages, similar to voice message mid-tech AAC devices. Recordings can be linked to photos taken with the built in camera for illustration of the recordings. Two sensors in the phone can be used for interaction tracking (e.g. with people and objects). All data is transferred via mobile phone network to a remote database for access by the story generating module of the system.

Data collection is also supported for use by parents at home to allow the participants to share experiences and stories from home. The phone, which is switch accessible, can be used for storytelling support using the voice recordings and photos taken. A natural language generation data-to-text system (Reiter 2007) generates draft stories from the collected data. These are displayed on the child's VOCA and can be edited and accessed by the child for interactive personal narrative activities.

In a final evaluation the mobile phone application was used with Peter (all names changed), 10;2 years old with athetoid CP; and Martin, 17 years old with a chromosomal disorder. Both participants had little AAC support at the beginning of the study. Their staff and parents were introduced to the system and training to use voice recordings in supporting personal narrative over a period of six months. A final trial week used both the mobile phone and the VOCA system to access narratives.

Feedback from parents and teachers reported a high impact on the participants' motivation to share stories about experiences. Feedback from Peter suggested that although he liked the fact that voice messages could be recorded to support his storytelling and he had displayed much enthusiasm during the evaluation to share

his stories, he felt that in general the stories did not reflect what he wanted to talk about. He had been equipped with and eye gaze VOCA towards the end of the study and indicated that he preferred this new system. Feedback on usability of the mobile phone application was in general positive and stressed the need for an intuitive interface.

Outlook

Funding is currently being sought to develop the system further and to deploy the system in schools for longer term evaluations.

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References

- Black, R., et al. (2009). "How was School Today...?" Evaluating the Personal-Narrative-Telling Prototype: Preliminary results. Communication Matters Symposium 2009. Leicester, Communication Matters.
- Black, R., et al. (2011). A Mobile Phone Based Personal Narrative System. The 13th International ACM SIGACCESS Conference on Computers and Accessibility, ASSETS'11, Dundee, UK.
- McCabe, A. and C. Peterson (1991). Getting the story: A longitudinal study of parental styles in eliciting narratives and developing narrative skill. Developing narrative structure. A. McCabe and C. Peterson. Hillsdale, NJ, Lawrence Erlbaum Associates: 217-253.
- Prior, S. (2011). Towards the Full Inclusion of People with Severe Speech and Physical Impairments in the Design of Augmentative and Alternative Communication Software. School of Computing. Dundee, University of Dundee. **Doctor of Philosophy**.
- Quasthoff, U. M. and K. Nikolaus (1982). What makes a good story? Towards the production of conversational narratives. Discourse Processing. A. Flammer and W. Kintsch. Oxford, North-Holland Publishing Co.
- Reiter, E. (2007). An Architecture for Data-to-Text Systems. ENLG-2007.
- Reiter, E., et al. (2009). Using NLG to Help Language-Impaired Users Tell Stories and Participate in Social Dialogues. ENLG2009, 12th European Workshop on Natural Language Generation. Athens, Greece, Association for Computational Linguistics.
- Waller, A. (2006). "Communication Access to Conversational Narrative." Topics in Language Disorders **26**(3): 221-239.