

How was School today...? – Using a mobile phone to support data collection for automatic narrative generation

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Abstract

The “How was School today...?” (HwSt) project has successfully introduced a new personal narrative tool for children with severe speech and physical impairments (SSPI). The system collects sensor data, voice recordings from school staff, and other information. The new implementation of the prototype system uses a mobile phone to facilitate and expand the data collection. Data now includes photographs that are automatically linked to multi-part voice recordings, and the possibility to read 2D barcodes for interaction and location tracking. Data collected with the phone is transferred automatically to a central server and then to the voice output communication aid (VOCA) of the student. The system automatically creates an interactive narrative on their VOCA that they can edit and use to talk about their school day experiences. We will present initial results from the evaluation of the system with two participants in a special needs school.

Extended Abstract

Introduction

Augmentative and alternative communication (AAC) can provide access to computerised speech output for individuals who have little or no speech and varying difficulty in understanding language. This can be due to some form of physical and/or intellectual disability, such as cerebral palsy or developmental delay. Computer-based speech generating AAC devices which provide access to prestored words, phrases and sentences are well suited to communicate needs and wants (such as *I am thirsty*). 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 about football) very well. Not only are these interactions essential for building vocabulary and general language acquisition; they form an essential part of the process of making and sustaining friendships and other social relationships. Indeed, social isolation is a major quality-of-life issue amongst people with communication impairment (Bercow, 2008).

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 & Peterson, 1991), helping us to shape our experience (Quasthoff & Nikolaus, 1982). Additionally, by telling and retelling, structuring and restructuring our personal stories we are able to reflect on our life to help us developing a sense of self (Polkinghorne, 1995). Sharing stories is a major part of both finding new, and maintaining present relationships and friendships.

Our goal is to develop AAC tools that support storytelling and social dialogue. As a step towards this vision, we constructed a proof-of-concept system for helping children with communication disabilities to construct and tell stories about their day at school (R Black, Waller, Reiter, & Turner, 2009; Ehud Reiter et al., 2009). We deployed sensors to track the children’s location, activities, and interactions; created a natural language generation data-to-text system (E Reiter, 2007) which generated a draft story from this data; and built tools which allowed the children to edit and interactively narrate the stories.

Data collection using a mobile phone

Feedback from the initial prototype evaluation (R. Black, Reddington, Reiter, Tintarev, & Waller, 2010) has lead to a modular system structure to allow for easier and extended data collection. All data for story generation is now collected by using a mobile phone. The phone is equipped with a microphone for voice recordings, an RFID (Radio-frequency identification) sensor for interaction tracking using RFID tags on

staff cards and objects (e.g. teaching tools and toys) and a camera that can be used for taking photographs or images of barcodes for interaction and location tracking (see Figure 1). During the evaluation of the system two participants carry the phone with them during the school day to allow staff to collect data. The phone automatically transfers any data collected to a server in Aberdeen for story generation. The stories are sent via email to the researcher who updates the VOCAs used by the participants to tell staff and parents about their day at school. We anticipate being able to automatically update data for the final evaluation. Data collection is also supported by parents at home to allow the participants to share experiences and stories from home. The following data is being collected:

Location tracking of the user. All rooms in the school that are accessible to the participating students such as class rooms and lunch hall display a sign with a QR code. When the participant enters a room during a time that is not scheduled in the timetable (e.g. going into the hall for a concert) staff use the camera in the mobile phone to scan the barcode. The barcode data is then transferred to the server where it is looked up and logged together with a time stamp.



Figure 1. QR code¹, encoding the text “ABCDEF01”.
This code is linked to a database entry to allow location or interaction tracking.

Interaction tracking of the student. Staff and peers at the school were given name badges that either contained an RFID tag or a QR code. The QR code can be scanned in the same way as the location barcode. The RFID tags can be scanned by holding the mobile phone to the name badge to allow the built-in sensor to detect the tag.

Voice recordings. Staff can record multi-part voice recordings (similar to using a Step-by-step or Sequencer), which can be tied with a photograph taken at the same time with the mobile phone. This supports easier access to the recordings later on the VOCA by showing the photograph on the retrieving button and for illustrating the recordings. The participating students can access the recordings on the phone for immediate use in the school (e.g. to tell the class what happened during a therapy session) either using the phone keypad or a switch that was attached to the phone.

Presentation of results

We will present preliminary results of the evaluation, including video footage of conversations about the school day between participating children and their therapists and family members.

Feedback gathered from users will be shown together with an outlook on possible future developments of the system.

¹ QR (Quick Response) codes can easily be recognised by a computer or mobile phone using an attached or built-in camera and freely available software. A list of available readers for mobile phones can be found at: <http://www.mobile-barcodes.com/qr-code-software/>

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References

- Bercow, J. (2008). *Bercow Review of Services for Children and Young People (0-19) with Speech, Language and Communication Needs*. Nottingham: DCSF Publications.
- Black, R., Reddington, J., Reiter, E., Tintarev, N., & Waller, A. (2010). *Using NLG and Sensors to Support Personal Narrative for Children with Complex Communication Needs*. Paper presented at the First Workshop on Speech and Language Processing for Assistive Technologies (SLPAT), Human Language Technologies: The 11th Annual Conference of the North American Chapter of the Association for Computational Linguistics, Los Angeles.
- Black, R., Waller, A., Reiter, E., & Turner, R. (2009). "How was School Today...?" *Evaluating the Personal-Narrative-Telling Prototype: Preliminary results*. Paper presented at the Communication Matters Symposium 2009.
- McCabe, A., & Peterson, C. (1991). Getting the story: A longitudinal study of parental styles in eliciting narratives and developing narrative skill. In A. McCabe & C. Peterson (Eds.), *Developing narrative structure* (pp. 217-253). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Polkinghorne, D. E. (1995). Narrative configuration in qualitative analysis. In J. A. Hatch & R. Wisniewski (Eds.), *Life history and narrative* (pp. 5-24). London: Routledge.
- Quasthoff, U. M., & Nikolaus, K. (1982). What makes a good story? Towards the production of conversational narratives. In A. Flammer & W. Kintsch (Eds.), *Discourse Processing*. Oxford: North-Holland Publishing Co.
- Reiter, E. (2007). *An Architecture for Data-to-Text Systems*. Paper presented at the ENLG-2007.
- Reiter, E., Turner, R., Alm, N., Black, R., Dempster, M., & Waller, A. (2009). *Using NLG to Help Language-Impaired Users Tell Stories and Participate in Social Dialogues*. Paper presented at the ENLG2009.