CM 2011, Leicester, UK:
Using a Mobile Phone to Support Data Collection for Automatic Narrative Generation

How was School today...?
Research Partners and Funders

Ehud Reiter  Annalù Waller
Nava Tintarev  Rolf Black
Joe Reddington
Ross Turner*

University of Aberdeen  University of Dundee  Capability Scotland

* Now at: Nokia Gates, Germany
Outline

• Aim & Background
• The Proof of Concept Prototype
• HwSt – in the Wild
• User feedback
The aim of our project is to investigate the feasibility of using Natural Language Generation (NLG) technology to support conversational narrative in AAC.

“Storytelling puts an equal emphasis on the feelings and audience involvement as on the structure of the story; and regards narrative development as a social process which begins in infancy and is scaffolded by adults”

[Grove, 2009]
Aim of the Project

Provision of support for personal narrative

• Scaffolding narration
  • Need some knowledge about content
• Provide and allow for easy access to vocabulary
  • Need to know vocabulary
• Easy narration
  • Interface design

→ Reducing cognitive effort by concentrating on content – NOT operational competence
Aim of the Project

How was School today...? – in the Wild

• Design of a system that could be used independently in a school without extensive support by the research team
• User centred Design
  • Feedback from previous system (How was School today...?)
  • User input from beginning
  • Iterative design process
Outline

• Aim & Background
• The Proof of Concept Prototype
• HwSt – in the Wild
• User feedback
User-centred Design

- Observations in special school
- Use of Step-by-Steps™ and home-school diaries
- Staff, parent & child input to design a system that would be able to:
  - automatically capture event data;
  - generate utterances to scaffold interactive narrative;
  - support evaluation and interactive narration of story.
RFID sensors track the child’s interactions with:
- teaching and other staff;
- peers and friends;
- objects such as teaching tools.

Event Data: Interaction Data
Event Data: Location Data

Sensors on doorways detect the location of the child.
Generating Utterances using NLG

- Example for Natural Language Generation (NLG): BabyTalk

You saw the baby between 16:40 and 17:25...

Over the next 24 minutes there were a number of successive desaturations down to 0. Fraction of Inspired Oxygen (FIO2) was raised to 100%. There were 3 successive bradycardias down to 69. Neopuff ventilation was given to the baby a number of times. The baby was re-intubated successfully...

Continuous monitoring of baby produces vast amounts of data.

Text reports like this can help doctors to make decisions about babies' medical care.
In the morning I was in the hall with Mrs Sound.

How was your day at school?

That's nice! What did you do?

I played the tambourine.
The timetable provides information about time, activity, interaction and location.
Voice recordings can be added to the database to provide additional information that cannot be detected by sensors.
The software looks reportable events by identifying:

- Exceptions to the timetable such as a change of location or teacher;
- Voice recordings;
- Detected interactions. These are usually the signs of an interesting event, i.e. a story.
A maximum of five generated event narrations are chosen to be presented at the top of the screen for direct access.

Each event consists of several messages – in this case 2 computer generated and 3 recorded messages.

Events and messages can be easily evaluated by the student using smiley buttons.
How was School Today?

Julie (name changed) speaks to her speech and language therapist about her day (second session).

- She uses a voice output communication aid (VOCA).
- A switch in her headrest allows her to select the scanned options on the screen.
- Her screen is mirrored by the monitor.
A visitor was there.

She is nice.

Then I went to Junior Primary instead of Reading.

A visitor was there.

"The Dental Hygienist came to give a talk."

Right! No reading?! Junior Primary? I wonder why that was.

Oh, a visitor, right. I wonder what the visitor was doing?

Oh! Dental hygienist. That was the visitor. Okay. That’s why you went to junior primary, mmh.

What did you think of the talk?

She is nice, that was good! Very good!

How was School Today?
Observations

- Initiation, more control, elaboration and evaluation
- Voice recording

Challenges
- Training for event recording
- Swiping of interaction tags
- Location sensor not practical
- Effort to keep VOCA running all day
- Battery life
- Interpretation of sensor data
Outline

- Aim & Background
- The Proof of Concept Prototype
- **HwSt – in the Wild**
- User feedback
HwSt-itW: Current project

Extend prototype to support users with higher and lower cognitive abilities

Group 2 (original interface):
- Users with complex communication needs (CCN) or severe speech and physical disabilities (SSPI)
- Can navigate graphical interface
- Can make choice out of several options
HwSt-itW: Current project

Extend prototype to support users with higher and lower cognitive abilities

Group 1:
• Users with profound intellectual and multiple disabilities (PIMD)
  - as a tool for teachers and therapists
• With learning disabilities, clear cause and effect knowledge, can make choice of up to two options
HwSt-in the Wild

Extend prototype to support users with higher and lower cognitive abilities

Group 3:
• Users with SSPI
• Can navigate complex interfaces
• Have clear idea of time and environmental relations (friends, timetable, school hours, favourites, linked stories)
HwSt-itW: Interface Options

- Implement more flexibility in access to stories and their narration including access to wider range of evaluations

- Then I went to Junior Primary instead of Reading.
- “The Dental Hygienist came to give a talk.”
- A visitor was there.

- Message need to be identifiable
HwSt - itW

Make prototype robust and useable within the school environment
• Battery life
• Hardware
• Compatibility with AAC devices
• Usability
  • Setup, data collection, information updates, story output
  • Users: children, therapists, parents, teachers
HwSt - itW

Dividing system into
• Data collection tool
• Storytelling Device

Group 1:
• Immediate access to stories
Portable, easy setup, long battery life: Mobile Phone

- Ubiquitous
- Touchscreen (used for switch access)
- Bluetooth to connect external switches
- Camera: Images capabilities, usable as sensor for interaction detection (QR code)
- Voice message recording and playback via inbuilt microphone and loudspeaker
- Indoor (Wifi) and outdoor (GPS) location tracking
- Easy wireless data transfer via Wifi, GPRS or 3G (UMTS)
Interaction detection

- RFID (e.g. Oyster Card)
  - Plus: reliable readings, fast (“swiping”)
  - Minus: Need special sensor (not many phones: Nokia and Google phone), long-term expensive, more difficult to update database system (can’t just print out another tag)

- QR Codes (2-dimensional barcodes)
  - Can be detected by built-in camera
  - Already commonly used with mobile (smart) phones (see Tesco)
  - Plus: cheap production of tags (printer)
  - Minus: slow, require time to take photo, not necessarily reliable readings (high error rate)
System design

Setup diagram:

School

Home

Data base

Mobile Phone

Story generation

Data transfer
Outline

- Aim & Background
- The Proof of Concept Prototype
- HwSt – in the Wild
- User feedback
Feedback

Staff Feedback (mobile phone use)

• 14 questionnaires (2 classes) to participating teachers and SLA’s
• Majority (13) used the phone (recordings, photographs, swiping, QR)
• Half (7) found the phone easy to use, 3 stated from “not easy” to “very difficult”, 4 with no feedback
• In general staff liked the phone but usability was an important issue which was exaggerated by the fact that the prototype still had bugs
User Feedback

• MA: Preliminary results! (Need to look closer into interview)
  • MA appeared to not like the mobile phone because it contained the wrong stories, things he didn’t want to talk about. He preferred the system when used with his eye gaze – hoping eventually to be able to choose his own words

Parents

• Didn’t find it too difficult
• Liked photo
• Confirmed their interest in things their child was up to in school
Feedback

Teachers:

• Greatly improved communication with home

• Impact on participants' enthusiasm to share stories (participants were reported to immediately wanting to use the phone when coming into class to share stories from home and actively seeking contact to staff outside the class to tell them their story)
Thank you!

Questions please

Today, 16:50, Room 2 (John Foster):
Suzanne Prior, Rolf Black, Annalu Waller and Thilo Kroll
Investigation of Narrative Use in the Care Environment