Ubiquitous User Modeling for a Complex Communication Aid

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The "How was School Today...?" system is designed to help non-verbal, pre-literate children modify and narrate a story about their day at school automatically and on-the-fly [4]. The system generates a draft story based on sensor data (collected with a mobile phone), and the children edit and tell the story using an appropriate user interface.

A key challenge for Augmentative and Alternative Communication (AAC) systems is the diversity of users; framed here as a user modeling problem. AAC users differ enormously in age, cognitive ability, linguistic skills, motor ability, social ability, and personal and environmental circumstances [8]: a user with no cognitive impairment and limited movement will need different assistance from a user with stronger physical abilities and major cognitive impairments.

AAC systems in research have often been tailored for a small group of individual users, with less focus on how the systems could be adapted for users with different ability profiles. An exception may be the Friend system which considers a range of linguistic/cognitive abilities [3].

As in other domains [7], user modeling in AAC can improve the personalization of content and presentation. Current systems can predict content such as the next letter or word [6], some of this prediction is based on external data sources such as location [1, 2]. Others are tailored but manually edited [5]. Non-personalized scanning predictions have also been used to improve communication rates [9]. So, while these systems may improve with training and usage, they are not based on a user model.

The AAC domain also differs from classical user modeling in that interfaces are often static, with few dynamic components – in particular, care needs to be taken with changing layouts and changing navigation. If an option is no longer available or is accessible through a different route, it may be difficult for a user to repeat an action [3]. Especially non-literate users may use the location of an icon on the screen as the cue for its meaning.

However, steps can be taken to cater for a wider range of users, modularly adding functionalities according to a users abilities. The "How was School Today...?" system supports three stages of ability, where control of the interface is gradually shifted from a carer/teacher to the child:

Stage 1: Children with very limited skills, or memory who are capable of pressing a 'Next' button on an interface. Teachers will edit content and set up a narrative, which the child can sequentially step through.

Stage 2: Based on the "How was School To-

day...?" prototype [4], children who can step through a story on their own and maybe add positive and negative embellishments (e.g. "This was fun!").

Stage 3: Brings in the ability to tell stories about previous days (as well as the current day), including favorites and frequently told events.

Additionally, the system is ubiquitous in that storytelling is supported on a variety of devices depending mostly on the child's physical abilities: a switch (a big button), a mobile phone (e.g. for playing back voice recordings), and the storytelling interface on their communication device or a PC. The idea is that the system can switch between stages and continue adapting to the user as he or she changes over time, including temporary regression and progress in development. The system has been iteratively developed and is being deployed and tested in a school.

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