Say what Simon says …: "Playing" a new approach for phonemic speech output
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Abstract

We are developing a new device which is aimed at supporting non-speaking individuals in literacy learning. The PhonicStick provides direct access to spoken phonics - a set of phonemes used in the literacy learning program Jolly Phonics - which can then be blended into words. In an initial study, children were able to generate novel words using the first level subset of six phonics. However, the full set of 42 phonics would require considerably more memorising effort. We will present different phonic games which are inspired by "Simon says", a hugely successful memory game in the 80's which generated an increasing sequence of sounds and lights which the player had to memorise and repeat. This will be an interactive session in which the audience will be invited to participate in evaluation and brainstorming activities.

Extended Abstract

Background

An important part in learning to write and to read is the ability to encode and decode words into their sound segments and to relate these to orthographical letters. Phonic-based literacy programmes encourage children to sound out words emphasising the way in which phonemes are blended into words. This activity is often problematic for children with speech impairments and may contribute to the difficulty that children with complex communication needs (CCN) have in acquiring literacy (von Tetzchner and Martinsen, 2000).

Current speech generating devices (SGDs) are based on generating novel text using literacy or on the retrieval of prestored text. Systems such as the Lightwriter are predominately text-based, while systems such as the Pathfinder and the Dynavox series use prestored words, phrases and sentences. Text-to-speech processors and recorded speech are used to generate spoken output.

Access to speech output via phonemes is not a new idea (Goodenough-Trepagnier and Prather, 1981) and SGDs have been used to encourage children to engage in phonemic-based activities since the 1980s (Ferrall, 2006). However, these techniques tend to use orthographic and picture interfaces, necessitating the navigation through a visual encoding system.

Typically developing children develop speech without any external interface. Although children are exposed to graphic and orthographic systems in books and in their environment, they speak before they are explicitly introduced to literacy. The Speaking Phonics project aims to develop ways in which children with CCN can play with and experience the use of sound without having to navigate a visual interface.

The PhonicStick

Physical access to technology is an ongoing challenge for people with severe physical disabilities. Various techniques have been developed to assist in the retrieval of targets using visual interfaces, e.g scanning techniques; mnemonic retrieval; coded retrieval; dynamic displays; prediction;
autocompletion and disambiguation (Beukelman and Mirenda, 2005). However, these interfaces require users to master visual navigation skills and learn to decode visual representations.

In order to minimise the visual interface issue, we have built and evaluated a prototype device which allows children to generate simple monosyllabic words by “collecting” and blending phonics into words. The inspiration for the PhonicStick came from the observation that many children with CCN can navigate their motorised wheelchair using a joystick, but experience difficulties when navigating a visual SGD interface. Several ideas also fed into the way in which sounds could be accessed, e.g. the silent phone (Pullin and Alm, 2006), the children’s game “Simon Says” (Hasbro, 2007), and alternative stylus access to orthography stylus (Perlin, 1998; Wobbrock, Myers et al., 2004).

A prototype talking joystick was developed to access the six phonics of the first learning stage in the Jolly Phonics literacy programme (Lloyd, 1998): /s/, /a/, /t/, /i/, /p/ and /n/. A mapping of these phonics, based on an existing stylus text input system (Perlin, 1998), is shown in Figure 1.

Table 1: Auditory feedback during the selection process

<table>
<thead>
<tr>
<th>Phonics</th>
<th>Access</th>
<th>Auditory Feedback</th>
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<tbody>
<tr>
<td>/s/</td>
<td>Push joystick to west position and then back to centre</td>
<td>/s/</td>
</tr>
<tr>
<td>/a/</td>
<td>Push joystick to north position and then back to centre</td>
<td>/a/</td>
</tr>
<tr>
<td>/t/</td>
<td>Push joystick to south position and then back to centre</td>
<td>/t/</td>
</tr>
<tr>
<td>/i/</td>
<td>Push joystick to north west position and then back to centre</td>
<td>/i/</td>
</tr>
<tr>
<td>/p/</td>
<td>Push joystick to south position, then anti-clockwise along the</td>
<td>/t/ /p/</td>
</tr>
<tr>
<td></td>
<td>circumference to south east position and then back to centre</td>
<td></td>
</tr>
<tr>
<td>/n/</td>
<td>Push joystick to east position and then back to centre</td>
<td>/n/</td>
</tr>
</tbody>
</table>

The preliminary study (reference to authors) with seven children showed that all participants were able to recall and use all six phonics without having been shown the mapping in Figure 1. We believe that the devices will have a positive impact on phonic awareness. However, we would like to preserve with mapping out all 42 phonics, but the challenge is how we access these without explicit training and without a visual interface.

The workshop
The workshop session will present the audience with the task of evaluating and experimenting with several interfaces and computer-based games which are currently being developed by a level 4 computing honours student. Participants will be able to explore and discuss the implications of using the PhonicStick as in both pre-literacy and literacy programmes. In particular, participants will engage in activities which will support the researchers in the gathering of requirements which practitioners believe will be essential to a device such as this.

**Outcomes**

Research indicates that the success of any product is dependent on early and continual engagement with all stakeholders (Sharp, Rogers et al., 2007). This workshop provides an opportunity for all stakeholders to be involved in the research and development of a novel product which will support the literacy learning of all children, especially those with CCN.

**Acknowledgments**

This work is funded by a grant from Capability Scotland. A patent on the PhonicStick was filed in 2006.

**References**


ISAAC 2008: Say what Simon says…