

# Dutch Public Broadcaster NPO's Signing Avatar Makes a Gesture

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In 2012, the Research and Development (R&D) team at NPO was asked: "What is the state of the art on automated sign production?" We decided to take a closer look and lead a market consultation on the topic. Below is Part 2 of a two-part series. To access Part 1, see our previous issue: <https://tech.ebu.ch/publications/ebu-tech-i-26>

## Part 2: Avatar considerations

Several avatar designs were available for the Proof of Concept (PoC). During the PoC development process it became clear that they were less suited for the 'Sand Castle' content because they had a human-like appearance but their signing was perceived as being 'unnatural' or 'robotic.' Since this would be difficult to improve, we decided after discussion with researchers and avatar designers, to use an avatar that does not have a human appearance. Our thoughts were that viewers would be more accepting of non-natural signing if the avatar looked 'cartoonish' or 'animal-like.' The effect of viewers being less accepting of artificial-looking gestures by human-like avatars is known as the "uncanny valley." An alternative avatar was created that was child-friendly and that viewers would expect to show only limited facial expressions: its name was Dino.

Making clear whose speech the avatar is expressing during the show was another puzzle we needed to solve. 'Sand Castle' has a narrator (invisible) and three protagonists named: Koning ("King") Koos, Sassa, and Toto. TV signing services typically use a sign language interpreter, who can take on the role of narrator, and the characters in the show. Since this would not be possible with the available animation technique we needed a different way to distinguish between the protagonists and the narrator. This was solved by creating colour alterations of the avatar matching the appearance of the character. For example, the avatar wearing a pink shirt would represent Sassa, a blue shirt Toto, and so forth. We showed this solution to a test panel who reacted positively to solution.

Figure 4: 'Sand Castle' episode with avatar Dino as aired on 26 September 2015.



## Project evaluation

This proof of concept was evaluated by 16 deaf and hearing-impaired children aged 6 to 8 at a school for the deaf, and their teachers. They watched a 'Sand Castle' episode with avatar signing and filled out a pictorial questionnaire. All expressed their enthusiasm for this new technology, and indicated that the signing avatar clearly added value to the experience of watching a TV-programme for this target audience. They also gave feedback on the technical limitations that need to be tackled in the future, especially with respect to facial expressions and more natural-like motion. To view the full report, see: [https://www.tno.nl/media/3385/automated\\_sign\\_language\\_tno\\_2014\\_r10825.pdf](https://www.tno.nl/media/3385/automated_sign_language_tno_2014_r10825.pdf)

A second episode of 'Sand Castle' was aired on NPO 3 on 26 September 2015 and simultaneously launched at the celebration of the annual World Deaf Day. To see the full episode, see: <http://live.schooltv.ntr.nl/video/het-zandkasteel-avatar/>. We noticed two types of reactions: some adults did not like the still, rather altering movements and insufficient non-manual expressions. However, others, especially deaf children and their parents, were enthusiastic, wondering where they could find more episodes 'with Dino.' Surprisingly, we learned that the signing was also much appreciated by some deaf adults that have limited skills in reading subtitles.

Supporting the broadcasting workflow in the future

It is important to synchronize speech and signing in a TV-programme, and to switch between avatars (or avatar texture) when another character or the narrator starts to speak. For the 'Sand Castle' series, the SiGML coding was rendered with the correct timings to video files in an automated process.

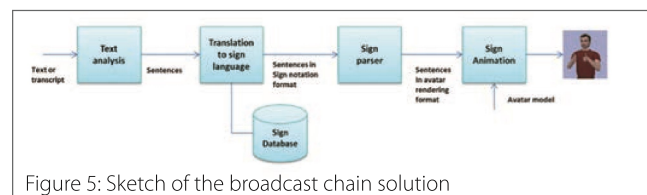


Figure 5: Sketch of the broadcast chain solution

Based on the positive feedback of the target group and our knowledge of the technical imperfections, the next step is to develop a sustainable broadcast chain solution. The focus should be on using broadcasting data to generate animated signing in which manual input and correction is limited as much as possible. To realize this, the partners that developed the 'Sand Castle' episodes with Dino are currently exploring the EU Horizon 2020 framework funding to see if there are possibilities to expand the project to the next step.