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ACELP Augmenting Communication using Environmental Data to drive Language Prediction

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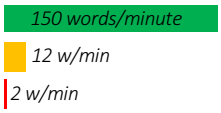
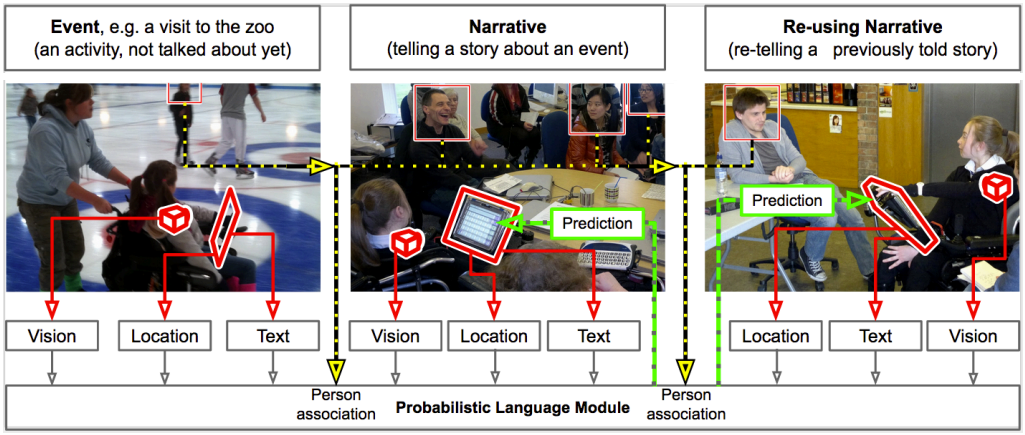
Our Aim

Our aim is to develop a communication system for nonspeaking people which will improve on the speed of communication by automatically populating the system with appropriate conversational items within an adaptive interface that provides control over timing and delivery whilst minimising physical and cognitive load.

Speech rate comparison: Natural speech (top), AAC: average (middle), switch access with acceleration, example (bottom)





Proposed System

Integrated contextual, adaptive SGD for individuals with physical disabilities:

- Use of computer vision and contextual data collection to inform prediction;
- Development of a new user interface for access to predicted words, phrases and stories.

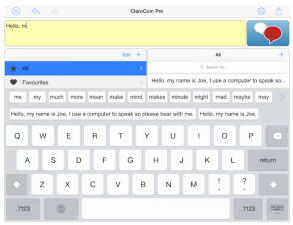
Possible through:

- Recent advances in environmental data collection;
- Ability to process large amounts of data in real-time;
- Probabilistic language modelling and the availability of mobile platforms.

Current AAC Technology

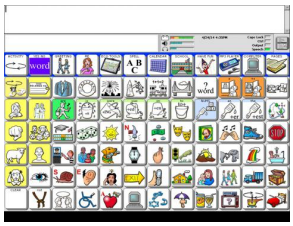
Text-based Speech Generating Devices (SGDs):

- Keyboard: direct access / scanning;
- Encoding, expansion, prediction, disambiguation.



Word and phrase prediction, on-screen keyboard, direct or scanning switch access. claro-apps.com

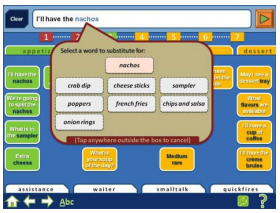
Disambiguation with direct access through eye gaze with dwell-free typing. tobiidynavox.com



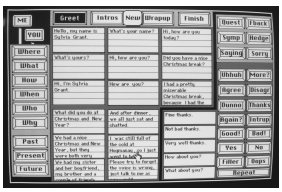
Encoding (Semantic Compaction) with direct or scanning switch access. minspeak.com

Use of Conversational Language Models:

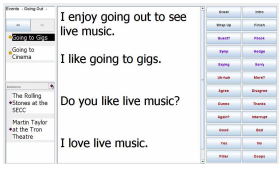
- Handcrafted contextual conversational items;
- Stages of conversation (e.g. greetings, farewells);
- Data-to-text sentence generators for narrative based systems.



Script based utterance system for situational conversations. McCoy et al. 2010



T.A.L.K. with handcrafted conversational items. Todman et al. 1994

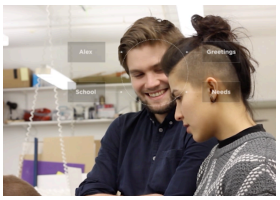


Data-to-text for automatic phrase generation based on personal experience data. Dempster et al. 2010

Use of Sensor Data :

- Context prediction;
- Story generation.

Location context determination using GPS and Wifi on iPhone; myvoiceaac.com



Egocentric video data for context relevant vocabulary identification and provision. Shamdani and Peña 2015

Limitations:

- Scanning word lists (prediction)
- Access method needs training (disambiguation)
- Limited vocabulary (encoding)
- Need to remember the existence and location of conversational items (encoding, pre-stored);
- Not timely or fitting (script, pre-stored)

References

Dempster M, N Alm and E Reiter (2010). Automatic generation of conversational utterances and narrative for Augmentative and Alternative Communication: a prototype system. SLPAT Workshop, Los Angeles, USA.

McCoy KF, J Bedrosian and L Hoag (2010). Implications of Pragmatic and Cognitive Theories on the Design of Utterance-Based AAC Systems. SLPAT Workshop, Los Angeles, USA.

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Acknowledgements

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