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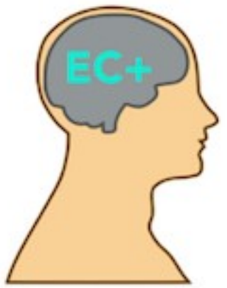

FACULTY OF ARTS AND PHILOSOPHY

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MULTIMODAL COMMUNICATION, YES. BUT WHAT ABOUT INTERACTION?

Hildegard Vermeiren- UGent- MMSYM Bielefeld, 16-17 October 2017

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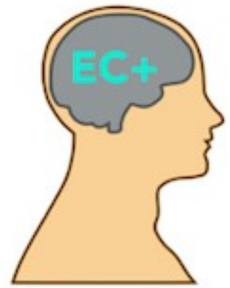
Project: ERA.STP.2015.0006.01



Partners:

- Multimodal application (Un. Málaga, Parc Tauli)
- Online course on sign language (Un. Klagenfurt)
- Online course on interpreting and multimodality (Un.Ghent)
- Training seminar, volume, symposium (December, Málaga)

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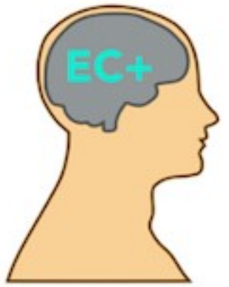

- In Ghent I teach a course on Interpreting Techniques and Technologies to students of a Post-graduate course in Conferen Interpreting.
  In the technological part I make them familiar with interpreting through skype, videoconference (polycom), mobile interpreting, apps such as Universal Doctor Speaker and Velotype speech-to-text, speech recognition, note-taking on a tablet (One Note).
- In my other interpreting courses (masters' level) I make my students familiar with video and mobile interpreting.

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- This paper is a reflection on a series of issues that raised during the development of the online course on interpreting and multimodality.
- **Multimodality at first sight seems only a matter of semiotics and new ways of communicating.**
- **But then multimodal applications raise issues of participation and interaction.**

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- In the past 10-20 years many applications have been developed for different kinds of communication. First came e-dictionaries, e-learning, e-translation (such as Google Translate), translation memories, aligned corpora, terminology management, etc.

- Progressively software was able to go further than written and spoken language: it integrates now speech, sound, text and images. It was the birth of the word “multimedia”. However, when speaking about multiple semiotic modes (kinds of signs that transmit meaning) on one device, it seems better to talk about the “multimodality” of the application or device.

- More specific applications were developed, among them multimodal apps for enhanced communication. A combination of sound and visual input can support communication when speech is impaired or when motor functions are limited. Eye-tracking systems even lift the need of motor action from the side of the impaired person.

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- In the context of this proliferation of multimodal applications, users sometimes find it difficult to select the application that most suits them. Selection becomes especially strategic when apps cost a lot of money and the full functionality of the application cannot be evaluated in advance. Especially when among the users there are vulnerable persons such as immigrants who speak non-western languages, children or persons with a sensorial or cognitive impairment, it seems wise to select the most efficient application. Beukelman and Mirenda discussed the issue of assessment criteria for finding the best devices for people with impairments.

- Due to time and practical constraints I will take a closer look to three applications:

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Universal Doctor Speaker: **an intra-semiotic app that translates and transforms text into speech**.

This application for mobile devices is a substitute for a human interpreter in a context of a medical consultation.

It was developed for a doctor-patient face-to-face conversation when there is no interpreter available. It contains a set of questions and answer ordered following subjects. All questions and answer are pre-programmed, although there is no direct link between questions on one side and answers on the other. Users clicks on a text in the source language, and then the message (question, answer) is said in the target language. The application can combine a certain amount of western/exotic languages. It is intra-semiotic (verbal language ><verbal language

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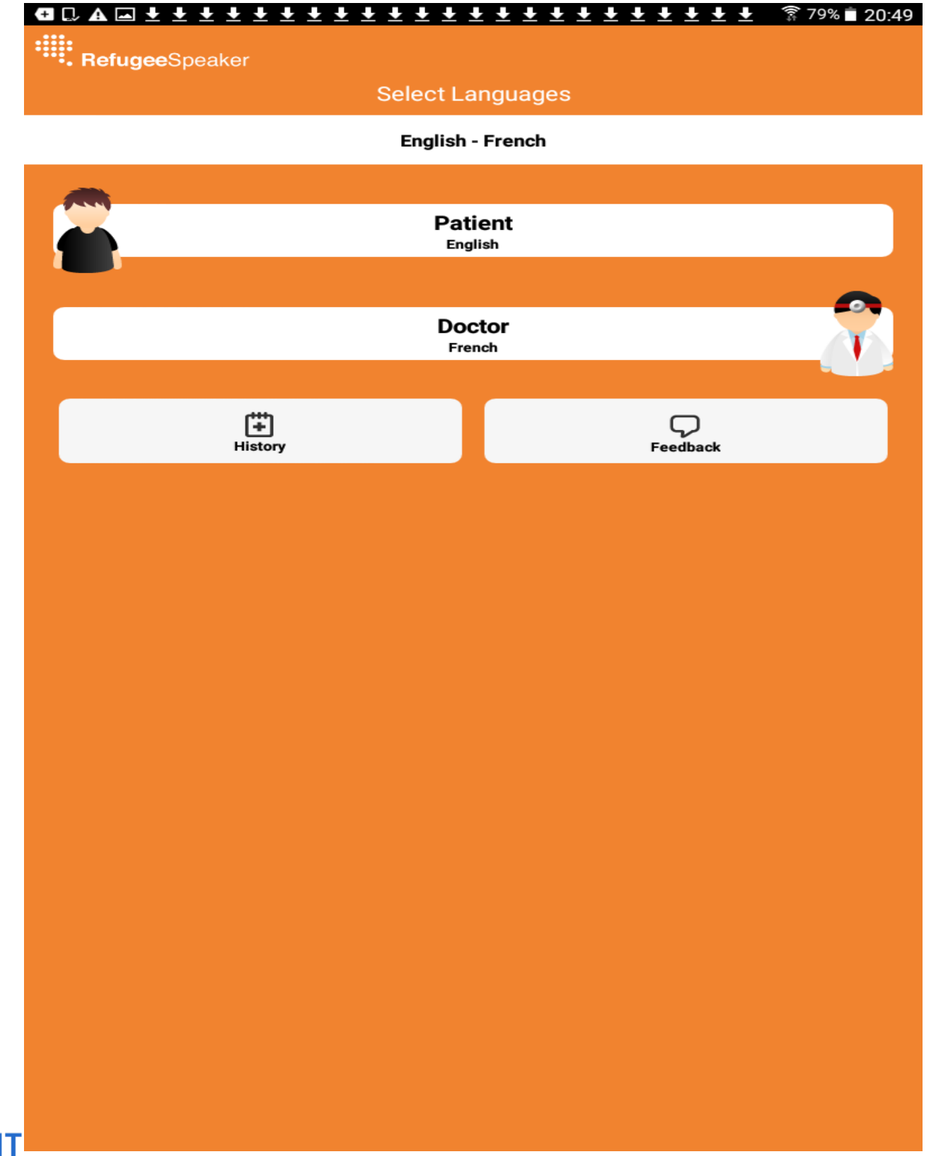

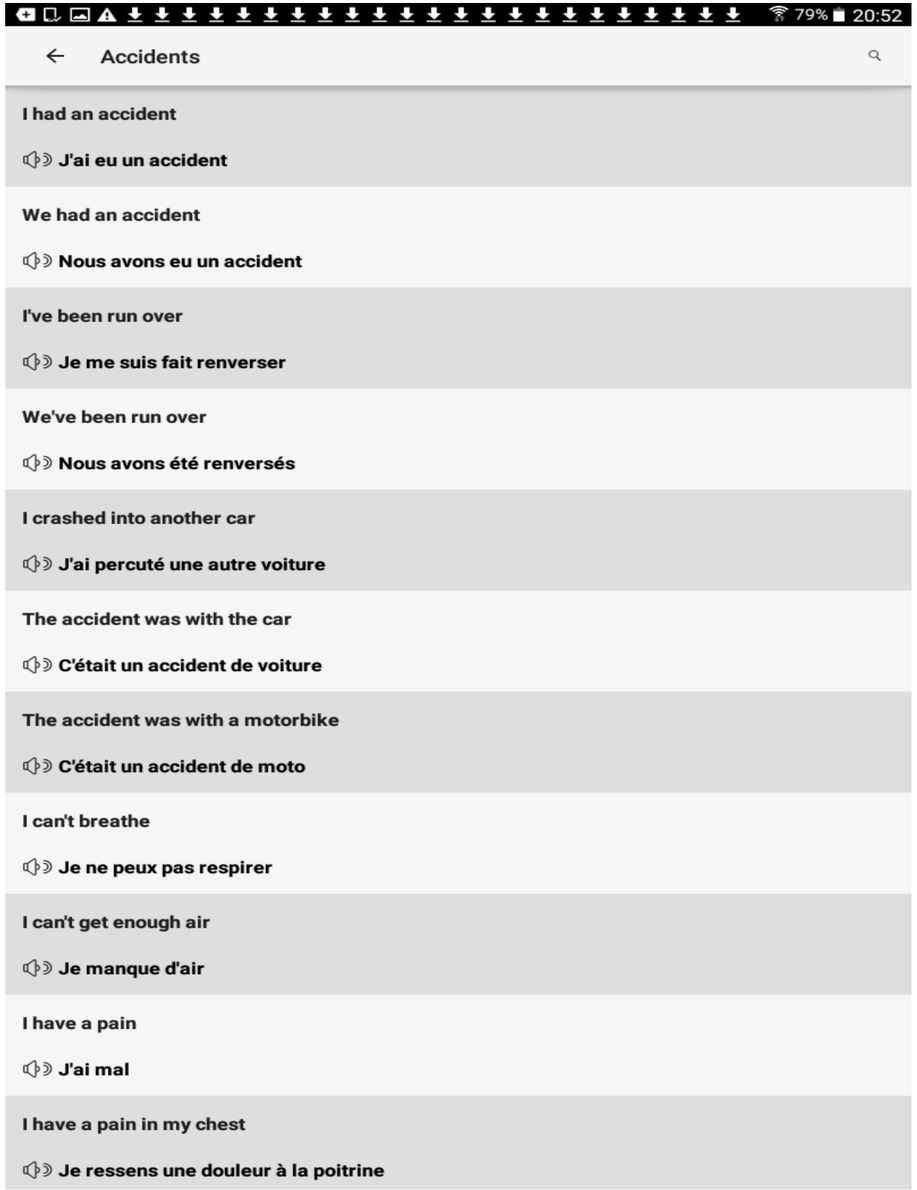

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- **Velotype speech writing**: **an intra-semiotic app for a speech-to-text reporter/interpreter.**
- This application for portables supports deaf or hard-hearing people who don't know sign language, but who speak normally.
- It can be used in language concordant or language discordant situations. It needs the intervention of a skilled interpreter. The interpreter writes down (and if it is the case, translates) for the person with the hearing impairment. There is no content or anything pre-programmed. It is intra-semiotic (verbal language ><verbal language i.e. speech-to-text). The best way to use the application is together with a special keyboard (V-board), that allows a higher writing rate and following the normal rate of conversation. The application can be used without the V-board.

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Ec+ Enhanced communication: **an inter-semiotic app that offers multimodal pages (text, sound, photographs, pictograms) for a 500-word lexicon**.

This applications was designed (in 4 languages) for devices such as mobile phones or tablets. Its target users are disabled persons and their caretakers. It aims at augment communication between people without and people with a communicative impairment. It is based on a vocabulary list of about 500 words that has been enhanced with pictograms, photos, video-clips and sign language (in Spanish, Catalan and German). No questions and answers are pre-programmed. All photos, pictograms, signing

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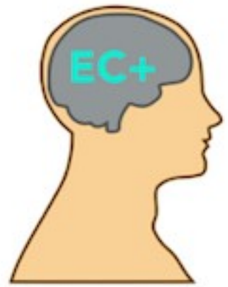

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- The reasons for choosing the aforementioned applications are the following:

- Two of them concern interpreting; one was developed in a project of which I am a partner (and I translated into Dutch), and for which I have to do dissemination work.
- The three applications match with the aims of the EC+project: augmentative and alternative solutions for difficulties in communication. However, they are situated on different places in a continuum:

- **Universal Doctor speaker**: persons who can support themselves with a digital device
- : persons with a sensorial impairment who need little support (from a speech-to-text **Velotype rep**orter or interpreter) to lift a communication barrier
- **EC+:** persons with a cognitive impairment who need more support (from a familiar or caretaker) to lift a more severe communication barrier

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- **First grid: basic criteria for multimodal applications for people with an impairment (for enhanced communication, but many of its criteria have general value)**

- Beukelman and Mirenda drew a 100-page overview of all conditions caretakers should take into account when selecting a device or application for AAC: they define criteria for predictive assessment based upon assess motor capabilities (including manual signing : fingers, hands, head, eyes, legs, knees, foot) , the ability to understand functional meaning, the ability to answer to questions with a symbol, advanced symbol use, categorization. But they don't give us a simple grid.
- In 2012 van Balkom, Luiken & Golstein-Kramer took the initiative to publish the volume *iCon Apps In communicatie ondersteuning met Apps. Initiatieven nemen*. The reason for publishing the volume was the fact that apps for enhanced communication have extended and that (the method of) a criteria-based predictive assessment seemed useful to make the right choice. I will deepen the issue of predictive assessment criteria. This volumes gives an overview of 83 iOS apps that were designed for persons with communicative disabilities and that are available in Dutch. Van Balkom e.a.'s overview is structured on the basis of two grids.
- The first list of criteria is briefly mentioned in the introduction. It mentions the features that an application should have (see left column).
- However in this research we generalize van Balkom's criteria and apply them to the three apps we selected. When we match the applications them with van Balkom's criteria, we obtain the following results:

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Hoe kunnen iPad, Apps en aanpassingen voor de iPad ingezet worden als communicatie-hulpmiddel? Inmiddels zijn er meer dan 300 apps beschikbaar voor mensen met communicatiebeperkingen. Veel van deze mensen zijn voor hun dagelijks functioneren afhankelijk van een passende vorm, methode en/of hulpmiddel voor ondersteund communiceren. Van Ondersteunde Communicatie is sprake als communicatievormen en zintuigen elkaar functioneel vervangen, ondersteunen of aanvullen op het moment dat het waarnemen, verwerken, begrijpen en uiten van spraak, schrift of gebarentaal niet (of niet meer) mogelijk is.
Ouders, behandelaars, leerkrachten en familieleden van mensen met ernstige communicatiebeperkingen zijn vaak op zoek naar communicatie ondersteunende toepassingen. Velen overwegen de aanschaf van een iPad of beschikken er al over. Het downloaden van apps is dan 'een fluitje van een cent'. Maar hoe weet je waar je zoeken moet en wat wel of niet kan? Zoekend naar antwoorden op die vragen beland je al gauw op verschillende websites met overzichten van apps. De meeste overzichten geven echter geen richtlijnen of criteria op basis waarvan de best passende app en benodigde iPad-aanpassingen gekozen kunnen worden.

Dit boekje beschrijft 83 apps voor communicatieontwikkeling en –ondersteuning.
We beschrijven en geven aan hoe de iPad en apps aangepast en toegankelijk gemaakt kunnen worden. Als basis daarvoor dient het Communicatie Competentie Profiel (CCP) en de criteria die we ontlenen aan ICF (International classification of functioning, disability and health).

Dit boekje is vervaardigd in opdracht van Stichting Milo: Wegbereiders in communicatie en kwam tot stand in samenwerking met Koninklijke Kentalis, de Leerstoel Ondersteunde Communicatie voor mensen met meervoudige beperkingen van Radboud Universiteit Nijmegen/Behavioural Science Institute, de Nederlands/Vlaamse organisatie voor Ondersteunde Communicatie, ISAAC-nf en Vilans.

milo · Leerstoel Ondersteunde Communicatie · isaac-nf · Vilans

iC iCon Apps

Hans van Balkom, Daniëlle Goldstein-Kramer en Hans Lulken

iC iCon Apps

Initiatieven nemen in
communicatie ondersteuning met Apps

Hans van Balkom, Daniëlle Goldstein-Kramer en Hans Lulken

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Do the chosen applications comply with the following requirements?	Universal Doctor Speaker text-to-speech translation	Velotype speech-to-text	EC+ Enhanced communication
To have a lexicon based upon human development, in a multimodal presentation (sound, text, gestures, pictograms, photos)	On the human development scale, the lexicon is at adult's level, but it uses plain language. It is integrated in a Q/A format. Multimodality is limited to text transformed in speech.	No lexicon. Its multimodality is limited to speech-to-text.	Lexicon of Mac Arthur. The lexicon is based upon human development. Single word vocabulary. The app is multimodal (sound, text, pictograms, photograms, gestures in three languages).
To be universally accessible.	Yes, if there is internet.	Yes, if there is internet.	Yes, if there is internet.
To have good quality sound recordings.	Yes.	No need of sound (target user is deaf)	The sound is a bit weak in Dutch.
To be ready for whispering talking.	Not relevant.	Not relevant.	Not relevant.
The multimodal modes must be mutually transformable.	There is a transformation. Text>Speech (1 transformation, not reverse)	There is a speech-to-text transformation (without or with translation).	Modes are seen together on one page, but sound or video can be activated separately. They represent the same thing.

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Speech must be of a normal pace.	**Speech is integrated in the product. Its pace is normal.**	**Pace is very important in this medium. The input speech must be at a normal pace. When the interpreter has the V-board, he can follow the pace of the input. If he uses a common keyboard, the pace of the input must be slower.**	**Speech is integrated in the product. The pace of speech in the audio or video clips is normal.**
Can be adapted to formal or informal style (=register).	No. Everything is pre-programmed.	Yes, the reporter or human interpreter can adapt the register. The adaptation can be from formal><informal.	No. There is nothing pre-programmed but this kind of applications doesn't fit with a formal style, since it applies over-accommodation to the disabled person.
The device must be mobile and light.	The app can be displayed on tablet or mobile phone of one or both of the users. The support is mobile and light.	The app. is used by the reporter or interpreter on a common laptop or a V-board & screen.	The app can be displayed on a tablet or mobile phone owned by the familiar, caretaker of the disabled person. The support is mobile and light. This could even be a weakness, since it could be difficult to use for a disabled person.
The device must be nice to see and exclude any stigmatization.	The app is orderly and simple in its design, but it is stylish.	The application is used with a normal screen. There is no risk of stigmatization since it is used indoors. Since it requires a keyboard it is not easy to use it in mobile conditions. In mobile conditions, speech recognition can substitute it, but not yet when it must be translated too.	The app is nice to see (colors, drawings).
The interface must be easy to manage.	The interface as such is easy but switches (interaction) take time and adjacent answers are not always easy to find.	The interface is easy. There are training sessions for interpreters who use a V-board. Speech recognition is the next step.	The caretaker must get familiar with the application in the first place, and the disabled person in the second place. So as to use together the interface.
The device must be solid.	Tablet or mobile phone.	Laptop.	Tablets or mobile phones are okay for the caretakers but maybe not for the disabled.
The device must have a great autonomy (at least 6 to 8 hours).	Tablet or mobile phone.	Laptop.	Tablet or mobile phone.
The output must be through voice, a printer, a screen and a display for export, selection and execution.	There is a display for text and voice.	There is a display for text.	There is a display for text, pictogram, photograph, and sound.

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The device must have a good service.	**Not relevant. The provider can make improvements.**	**Not relevant. The provider can make improvements.**	**Not relevant. However Malaga can make improvements.**
The device must be easy to read.	Yes. It reads easier on a tablet than on a mobile phone.	Format can be adapted on the screen to the format wished by the deaf or hard of hearing.	Since the visual aspect is important, it must be easy to see. This goes easier on a tablet than on a mobile phone.
The device must be connectable to other periphery devices.	Not relevant.	Not relevant. In case for printing the translated text.	Not relevant.
The device must be connectable with a recorder, a beamer, braille writing machine.	The device is designed a for face-to-face conversation.	Connectability is relevant when there are several deaf people. the device can be connected with a beamer to have a projection on a wide screen.	Not relevant. The device is designed for face-to-face conversation. Not for any projection.
The connection with a network must be easy.	Yes, since it depends wi-fi.	Not relevant, the application can be used off line.	Yes since it depends on wi-fi.
The price must be low.	There are two versions: for free/paid version. This is not the result of a project but a private initiative that is partially for free.	For free.	For free. As a result of a project.
In case of any system breakdown, it should be easy to have a new one quickly or a quick reparation.	Not relevant.	Not relevant.	Not relevant.

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- **Second: on the side of the app user (the disabled person) and his Communicative Competency Profile (CCP):**
- Van Balkom e.a. ‘s volume then presents an assessment grid for the Communicative Competence Profile of disabled persons based upon 10 basic functions. Then Van Balkom e.a. use this grid to describe the analyzed applications.
- Through feature matching between the CCP of the person and the available applications, the best possible application can be selected depending upon the level reached (or specific abilities or impairments). However, participation or interaction are not mentioned in the required functions. We applied van Balkom’s criteria to three applications.
- However, something can be said about interaction too. It is present through three different ways. Universal Doctor Speaker has interaction integrated in its design. Velotype is used in a conversation where an interpreter co-manages the conversation between the interlocutors. EC+ is designed for use together with other people: the caretaker or the disabled starts the interaction.

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What does the app require from its users? Based upon the 10 functions of the CCP.	Universal Doctor Speaker text-to-speech translation	Velotype speech-to-text	EC+ Enhancing Communication
Attention, split attention, executive functions.	Yes (to be able to read and to speak). A bit of planning. First motive of the visit, symptoms, examination, therapy.	From the interpreter: attention. From the deaf person: attention. No planning needed.	From the caretaker: attention and planning. From the disabled person: attention, no planning.
Perception through the senses.	Yes (to be able to see and to hear and understand)	To be able to see and read.	Yes: the caretaker has to know or to observe which modes are useful: speech, text, sound, image.
Memory.	Yes.	The interpreter needs his working memory to write down the text, and to use strategies such as segmentation.	Yes, to remind the meaning of the pictograms. Learning is needed.

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Cognition.	**Yes, as usual.**	**Yes, as usual.**	**Yes, cognition is needed to remember the pictograms and less, the photographs.**
Language comprehension, production, vocabulary	Yes, very much needed, but production is limited to the pre-programmed sentences. There is no interlocutor who can adapt his speech.	Yes, very much. But interlocutors can adapt their speech if needed.	To a lesser extent. Interlocutors can adapt their speech if needed.
Orientation	No.	No.	No.
Ability to adapt	Yes, to adapt to an unknown doctor.	Yes, to adapt to the interactants: an unknown caretaker and an unknown interpreter.	Yes. To use or play with a device based on sound, pictograms, photographs, gestures.
Social functioning/integration.	Yes : at the doctor's ward. But the dialogue is fixed. Rather good for emergency framework, where there is no time for long interaction: straight to the urgent point.	To be used in any situation. Not limited to one situation.	To be used in a many conversations, not just one. The app aims at enlarge the number of persons the disabled persons can converse with.
Socio-emotional (no mention of interaction)	How to behave at the doctor's ward.	How to work together with an interpreter. To be patient and wait until the interpretation on screen has been provided.	To use the app/device together with another person (familiar, caretaker, teacher, educator), play.
Motor, mobility	Clicking is the only motoric skill required. It is a fine motor skill.	The interpreter uses the app, the client must not do anything.	Fine motor skill: holding the tablet or clicking with the fingers.

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- **Grid 3: Opportunity barriers and participation**
- Van Balkom e.a.’s volume is limited to two grids.
- Some aspects are not integrated in the aforementioned grids. One of them is participation, another is interaction.
- This leads us to the third grid. A series of conditions determine whether or not potential users have the opportunity to use or to share the use of an app or a device.
- Opportunity barriers depend among others on practical conditions or on the attitude or the skills of service providers.
- The following series of questions come from Beukelman & Mirenda (147-222) and concern ownership of the device.

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Does the application comply with the following requirements concerning its participation opportunities?	Universal Doctor Speaker text-to-speech + translation	Velotype speech-to-text	EC+ Enhancing communication
Both sides own the tool are on equal footing	One side or both sides (the doctor and the patient) own the tool.	One person owns the tool: the reporter/interpreter. He is not a primary, but a secondary participant.	The family or caretakers of the disabled person owns the tool, or the person himself (if he is able to carry the tablet with him).
Both sides have the ability to use the tool	One side or both sides are trained or not. The application can be used without training, but with some experience, it is easier to use.	The speech-to-text reporter/interpreter needs most training. The target user must only be able to read the text on the screen.	The caretaker is the person who should be trained, but the disabled person should be familiar with the application too.

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Both sides are aware of the opportunities and limitation of the application.	**Both sides to some extent are aware of the limitations of the application**	**The interpreter, or maybe the deaf person. Typing on a common keyboard doesn't allow to follow the speech rate.**	**The caretaker should be the first to be aware of limitations.**
Someone has the ability of solving gaps and avoid frustration among the participants.	Human interactants will (both) spontaneously add body language to solve gaps and avoid frustration.	The reporter/interpreter needs to have this ability.	The caretaker needs to have this ability.
The application is designed to be interactive (reception/production) from both sides of the exchange?	The interface is explicitly interactive (QA), however it is sufficient to have only once device (although two devices make it easier).	It is used in one sense of the conversation only. It should support interactivity. The reporter/interpreter does part of the interaction management.	The application is open to an interactive use, mostly guided by the caretaker or familiar.
The design is ethical, in the sense that it stimulates decision-making by the vulnerable participant.	It is ethical. The client and the doctor can communicate on a basic level and make choices or take decisions.	It is ethical. It gives the deaf persons the opportunity to take decisions.	At a low level, yes it allows to take decisions, with the help of the caretaker or familiar. However it concerns only daily matters: getting up, having breakfast or lunch, play, school, holidays, family, etc.

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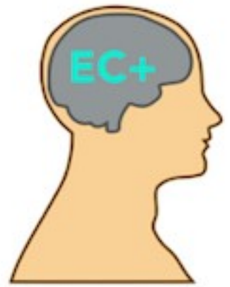

Grid 4: Interactivity

Van Balkom e.a.'s grids don't analyze how interaction takes place. However this is an important aspect of multimodal devices. Therefore, I made a grid of features to have a predictive assessment of the selected apps. The requirements are:

- Is there a clear definition of the target users of the application? If the profile of the users is defined, it is easier to predict some opportunities it offers or some problems that will raise.
- Is the device based upon scientific criteria?
- Is the interaction structure clear from the front page of the app? The clearer the interaction structure (positions of two interactants, questions and answers) the clearer how the interaction works.
- How easy or difficult is the operational access? Is access is easy, interaction will reach a higher rate.
- Are both participants given equal opportunities? This is a matter of participation.
- Are there different ways of accessing for (both) participants? The ways of managing the interaction can be different for different interactants.
- Does the application provide adjacency pairs for each exchange? In this case the interaction is clearer, but since it is pre-programmed it is more limited.
- Is there a turn-taking of turn-giving mechanism? Partially inside the device or should it be managed completely outside the device?
- Is there some instruction encouraging the provider to share turns with the client?
- How rich is the multimodal design? This is no question concerning semantics, but concerning the access to interaction. It can be through speech or clicking on visual information, and talking simultaneously.
- Is the multimodal design playful (stimulating motor, sensory, linguistic and cognitive abilities)?

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Does the application comply with the following requirements concerning interaction opportunities?	Universal Doctor Speaker text-to-speech + translation	Velotype speech-to-text	EC+ Enhancing communication
Is there a clear definition of the target users of the application?	No, which means that the target users of this app are general. In other words: people without impairments.	Target audience are deaf people.	Target users are caretakers and family members of people with a disability (list included in the pages of the application)
Is the interaction structure clear from the front page of the app?	Yes, there is a clear division between the patient and the doctor, from the first page on.	The two primary participants both talk, but in one direction the reporter/interpreter writes down the text so as to make it readable for the hard-of-hearing person.	No, the display shows the pictograms without suggesting interaction.
Is the device based upon scientific criteria?	The app is based upon an interaction pattern, but the adjacency pairs are limited to assertions and questions-answers. However it is possible to formulate several assertions or questions or answers, to avoid too much come-and-go.	Not clear, it is just a kind of writing app.	Mc Arthur's vocabulary list, list of syndromes and behavior and communication disorders. There is no real explanation concerning the word list or the pictograms. The multimodal nature should have been clarified better in the general texts.

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How easy or difficult is the operational access?	Easy for people who are more or less familiar with mobile devices and translation apps. Requires fine motor skills and language skills (to read).	For the interpreter it is not too difficult. The interpreter is supposed to be a person without an impairment.	For the disabled person, it is not too easy. It could be beyond his possibilities.
Are both participants given equal opportunities?	In theory, yes. This depends on the fact whether there are two devices or only one that interactants have to share.	Yes. The deaf person sees the screen, the other not (but he doesn't understand anyway).	No, it is more difficult for the disabled person to first understand, and next, use the application.
Are there different ways of accessing for both participants?	Both users define themselves as patient or doctor and choose their language profile in the same way.	Only the deaf person has access to what the interpreter writes.	Yes. The caretaker has it on his own device, the disabled person has to work with the device of another person.
Is there a turn-taking of turn-giving mechanism?	Yes. But the users have to manage it themselves, turn allocation is not automatic.	No, turn allocation is free. In fact it depends upon the participation framework.	No, turn allocation is free. In fact, it depends upon the participation framework.
Does the application provide adjacency pairs for each exchange?	Yes there are adjacency pairs, but they are not always visible. You see questions without the answers or answers without questions.	No. Interaction is free. Interaction depends on the initiative of the interactants.	No. The caretaker has to invest in interaction, allocation of turns and adjacency pairs. However, the impaired person can to self-allocation or produce ad adjacency pairs.
Is there some instruction encouraging the provider to share turns with the client?	No.	No.	No.
How rich is the multimodal design?	Written-spoken language(s). Intra-semiotic. Less rich.	Spoken-written language(s). Intra-semiotic. Less rich.	Written, spoken language, pictograms, photos and gestures. Intra- en inter-semiotic. The richest.
Is the multimodal design playful (stimulating motor, sensory, linguistic and cognitive abilities)?	It is not meant to be playful. But the presentation is simple and light.	No, it is just a screen.	Yes it is meant to be playful but a caretaker has to stimulate its use and play with the disabled person. It is playful so as to make it easier to learn.

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Conclusion:

Grids can help us to formulate predictive assessments and to match users with applications.

Grids should pay attention to opportunity (participation) and interaction issues (turn-taking, allocation of turns through series).

Applications are situated on a continuum.

Beukelman, D. & Mirenda, P. (1998) *Augmentative and Alternative Communication. Management of severe disorders in children and adults. Baltimore*: Paul Brookes Publishing Co.

Van Balkom, H., Luiken, H. & Goldsteijn-Kramer, D. (2012) *iCon Apps. Initiatieven nemen in communicatieondersteuning met apps*. Woerden: Stichting Milo.

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