



Adjusting Interaction Levels in a Speech Translation System for Healthcare

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Introduction



- **Converser for Healthcare**
 - Intro
 - Demo
- **Kaiser Permanente pilot project**
 - Needs and setup
 - Kaiser's evaluation (with numbers!)
- **System revision**
 - Especially ... adjustment of interaction levels
- **Future need for adjustment of interaction**
 - Telepresence
 - Emergency response
 - Law enforcement
 - Military

Converser for Healthcare: Intro

- Patented verification and correction of translation
 - Reliable Retranslation™
 - Meaning Cues™
- Customizable Translation Shortcuts™
- Bilingual transcripts

The screenshot displays the Converser software interface. On the left, there is a 'Translation Shortcuts' panel with a tree view of categories like 'Shortcuts', 'Background information', 'Giving directions', etc. Below it is a 'Shortcuts' list with various phrases. The main window shows a conversation transcript with the following text:

INPUT: Edit and Re-Translate if necessary
this is a cool program

BACK-TRANSLATION: Is this what you meant?
This is a cold program

Pronounce Back-Translation

MEANING CUES: Double-click on a word to change its meaning
IS (VERB): be
A (ARTICLE): an
COOL (ADJECTIVE): cold, fresh, chilly, chill, stony, nippy
PROGRAM (NOUN): computer programme, computer program, programme, applet

TRANSLATION
éste es un programa frío

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Translation is in progress. Dr. Smith

Overlaid on the right is a 'Change Meaning - COOL' dialog box. It has a 'Part of Speech' dropdown set to '1. Adjective' and 'Meaning Cues' checkboxes for 'Definitions', 'Synonyms' (checked), 'Examples', and 'Associated Words'. The main text area shows 'this is a cool program'. Below it is a list of suggestions:

1. SYN cold, fresh, chilly, chill, stony, nippy. [current meaning]
2. SYN quiet, level, peaceful, calm, nice and quiet, self-possessed, disimpassioned.
3. SYN great, fun, tremendous, amazing, neat, super, fantastic.
4. SYN cold, distant, uncommunicative, unapproachable, standoffish, withdrawn, solitary.
5. DO NOT TRANSLATE

Buttons for 'Retranslate' and 'Cancel' are at the bottom right of the dialog box. Red arrows point from the list items in the dialog box to the corresponding text in the main window's transcript.

Kaiser Permanente Pilot

- **Three departments at San Francisco Medical Center**
 - **Pharmacy:**
 - **Consulting or Drop-off** use case
 - *Shortcuts:* Consultation: Typhoid Vaccine
 - **Pickup** use case
 - **Greeter** use case
 - **Inpatient Nursing**
 - *Shortcuts:* IV, External Catheter, Pain Assessment
 - **Eye Care**
 - *Shortcuts:* Informed Consent for Cataract Surgery



Kaiser's Goals

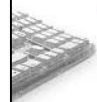


Problem Project is Solving:

- Members' language needs remain unmet in many situations throughout the KP organization.
- Since the needs vary from situation to situation, no single solution can be expected. Different interpretative solutions need to be tested and analyzed to determine their best fit on multiple variables such as setting, situation, type of patient, etc.
- Accuracy of translation and member/patient acceptance of technology-based interpretive services vs. in-person interpretation need to be assessed.

Equipment (1): EliteBook Setup

- **Good points:**
 - **EliteBook:** Fast; has touchscreen; runs standard image; foldable for portable use; has own keyboard
 - **Wacom Pen Display:** no handing computer back and forth
 - **TableMike:** excellent noise cancellation; hands-free operation; on-signal; easy to switch between staff and patient
- **Drawbacks:**
 - Too much equipment for crowded areas
- **Conclusions:**
 - Best for roomy over-the-counter situations with infrequent movement of equipment



Equipment (2): Motion Computing F5v Setup

- **Good points:**
 - All functionality contained for one-handed portability
 - Liquid-tight for leak-proof sanitation
- **Drawbacks:**
 - Sound volume too low for noisy settings
 - Aux speakers are unwelcome extra items
 - Docking station heavy, so stationary
 - Peripherals (keyboard, etc.) connect thru clip-on dock
 - Standard image not yet available
- **Conclusions:**
 - Upgrade to MC J3500
 - Twin speakers for added volume
 - Portable clip-on keyboard: no need for dock
 - Touchscreen: minimize stylus use

Member/Patient Evaluation Comments



The system was described as:

- “cool”
- Useful – **5 mentions**
- “looks good” “well done”
- Would help
- Good tool – **2-3 mentions**
- I would recommend it
- Even if translation was not 100%, it was always understood
- “Perfect and clear” – **2 mentions**
- Saving time – don’t have to wait for an interpreter
- “I like it”
- “I like the idea of it”
- Good for emergencies – **2 mentions**

- GUI too complicated (need larger buttons, crowded screen, ...) – **6 mentions**
- Literacy issues: some immigrants can’t read or write – **6 mentions**
- Font size too small - **3 mentions**
- “Too technical for me” “I don’t like computers”: family say elderly can’t use – **8 mentions**
- Quality of Sound/Volume issues – **6 mentions**
- Handwriting didn’t work – **6 mentions** (Note: usage limited)
- Worries about quality of translation – **2 mentions**
- Keyboard issues (hard to use, pen is faster ...) – **5 mentions**
- Problems with English voice – **2 mentions**
- System slow or froze – **6 mentions**
- Hard to use tablet in hospital – **1-2 mentions**

General Member Comments



- Training (for users) would be needed – **4 mentions**
- Product would be “ideal” with voice recognition – **4 mentions**
- A lot of mixed comments – they like the system but worry others (elderly, less literate) will struggle with it (these comments came largely from partial or full English speaking members).
- Would rather have an in person interpreter – **4-5 mentions**

Staff Evaluation: 10 staff provided feedback



+	▲
<p>The system was described as:</p> <ul style="list-style-type: none"> • Good for short interactions • Writing is easier than talking • Typing was easier than talking • You can verify translations better vs. Language Line – 2-3 mentions • I would use it if no other options • Portability is good 	<ul style="list-style-type: none"> • Occasionally missed a sentence • Computer literacy of members is a real issue – 3 mentions (also elderly can't double click fast enough) • User Interface – buttons crowded • Translations were a bit odd • Slow • Hard for patients to write on the tablet, in bed – 2 mentions • <u>Takes (valuable) time for the system to process</u>

- Training of patient's voice for DragonNaturallySpeaking would be needed.
 - But time is limited already (i.e. no time in visit to train patients) – **4 mentions**
- Training for staff and providers needed – **3 mentions**
- This product is really (more) needed for Cantonese/Mandarin here in San Francisco.
- The system needs a formal introduction (so system can describe itself, for English provider to use it with Spanish member)

Summary of Member/Patient & Staff Evaluations



- High praise for the “idea.” Higher than the actual experience of it.
- Translation quality definitely “good enough” as rated by Members/Patients.
- Limited English speakers (who can get along) would still use to verify the conversation and ensure completeness
- Issues of literacy and computer literacy impact applicability.
- Even though the system had issues (low to fair GUI, slow processing, lack of recognition of voice etc.), members partial or full English speakers thought it was “cool.”
- Most people, and especially those who lacked English skills, preferred an in-person interpreter. Although one person noted it saves time waiting for an interpreter, and a provider commented it saved the wait for Language Line.
- Good for emergencies
- Hard for members to use tablet in the hospital
- A number of patient declined to use in hospital but lacking data as to why.

Member/Patient Evaluation Summary

Member/Patient Evaluation	% answered question*	Rated (5) Completely and (4) Most
Did this meet your needs?	79%	94%
Was it accurate?	79%	90%
Was it easy to use?	72%	57%
Prefer handwriting question	67%	68%
Prefer using keyboard	67%	17%
Prefer to use handwriting and keyboard	67%	12%

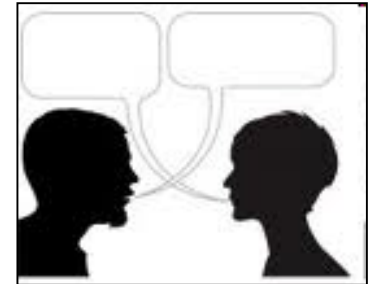
Includes input from all settings: Outpatient Pharmacy, Hospitalized Patients, Outpatient Optometry.

Total of 61 interactions observed. Some patients declined to answer the question or were not asked the question.

Converser 4.0 Features (1)

- **Speech recognition:**

- **Training-free speech for both sides!**
- **Spanish speech input enabled!**
- On-screen push-to-talk button



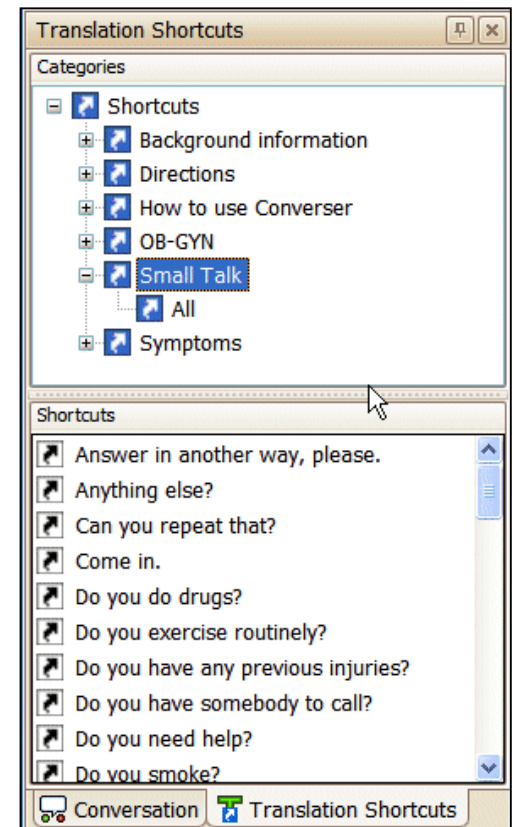
- **Interface, training:**

- Improved English<>Spanish switching
- Large fonts for all windows
- Eliminate in-person training
- **No-check Mode: can bypass MT verification**



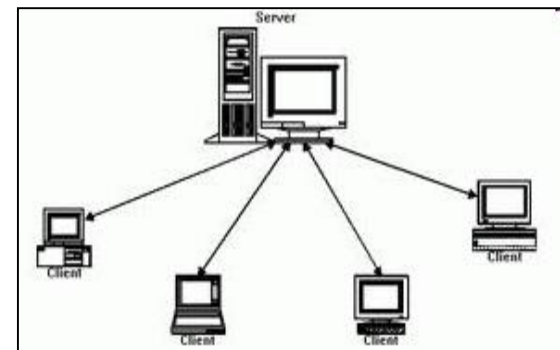
Converser 4.0 Features (2)

- **Translation Shortcuts:**
 - Many new categories
 - Emergency Room
 - Nutrition
 - ...
 - New *Introducing Converser* Shortcuts
- **Text-to-speech:**
 - Speed controls for TTS



Converser 4.0 Features (3)

- **Handwriting:**
 - Improved correction interface
- **Typing:**
 - Onscreen keyboard with larger keys
 - Text entry by finger
- **Centralized installation, maintenance:**
 - Web-based delivery
 - Eliminate in-person maintenance



New Interaction Tools

The screenshot displays the 'Converser™ for Healthcare' application window. The interface includes a menu bar (File, Edit, View, User, Translation Shortcuts, Text-to-Speech, Speech, Help), a toolbar with various icons, and a main workspace. On the left, there are two panels: 'Translation Shortcuts' with a tree view of categories like Pharmacy, Nursing, and IV, and 'Shortcuts' with a list of medical scenarios. The main workspace is divided into an input area at the top and a transcript area below. The input area contains a text box and a 'Translate' button. The transcript area shows a conversation between a 'Host' and a user, with the original text and its translation. Annotations with yellow arrows point to specific features: 'Earring Icon (green)' points to a green earring icon in the toolbar; 'Rewind Button' points to a black button with a left-pointing arrow; 'Traffic Light Icon (green)' points to a traffic light icon with a green light lit; 'Mic Button' points to a red circular button with a microphone icon; and 'Back-translation in Transcript' points to the original text in the transcript area.

Converser™ for Healthcare

File Edit View User Translation Shortcuts Text-to-Speech Speech Help

ENGLISH • SPANISH

Translation Shortcuts

Categories

- Pharmacy
- Nursing
- External catheter
- Foley catheter
- IV
- Patient
- Staff
- Lab draw

Shortcuts

- After I find your vein, I will inject some saline solution to make sure that the IV is working.
- Do you feel any discomfort from the IV right now?
- Do you have any questions?
- I couldn't find this vein. I'll have to try another one.
- I couldn't find your veins, so I will ask

INPUT: Text to be translated.

Translate

Earring Icon (green)

Rewind Button

Traffic Light Icon (green)

Mic Button

TRANSCRIPT: A record of your conversation. * = Login User

Host (Huesped, M.) (1): San Jose is a pleasant city
San Jose is a pleasant city

Host (Huesped, M.) (1): San José es una ciudad agradable

Back-translation in Transcript

Ready

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Mr. Host

EN 5:14 PM 8/28/2014

Verification Controls



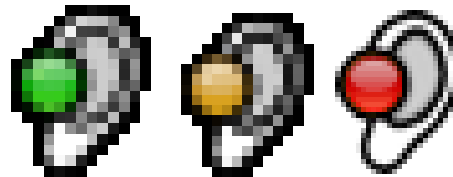
Yellow: Proceed with caution!
(Do pre-check.)

Green: Full speed ahead!
(Don't pre-check ... but transcript shows back-translation!)



Translation

Red: Stop!
(Lock to prevent accidental use.)



Speech Recognition

Future Need for Adjustment Tools

- **Beyond healthcare ...**
- Telepresence
 - e.g. for business
- Emergency response
- Law enforcement
- Military



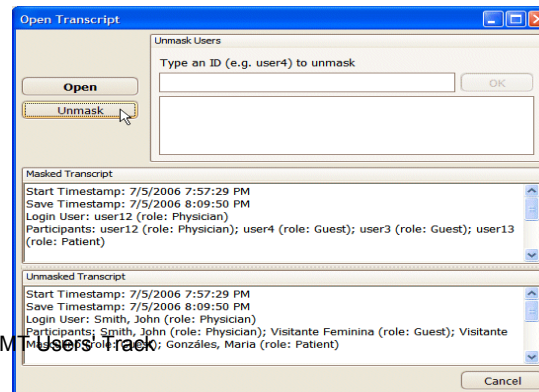
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Future Features

- **Converser 5.0:**
 - Mobile delivery: e.g. iPhone, iPad
 - Other languages
 - E.g. English<>Chinese (Mandarin, Cantonese)
 - Transcripts:
 - Direct download to EMR
 - Personal, shared Shortcuts



Sendoff



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