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Theoretical and methodological issues regarding the use of Language Technologies for patients with limited English proficiency

Harold Somers

School of Languages, Linguistics and Cultures

University of Manchester, UK

Overview

- Background: PLEPs and LT, especially Medical SLT
- Different users, different scenarios
  - Pathway to healthcare
  - Language technology
- SLT or other (lesser) technologies?
- Some experiments with lo-tech solutions
- Conclusions

Background: PLEPs and LT

- Huge literature on language barrier problems for Patients with Limited English Proficiency …
- … **and** their doctors/healthcare providers
- Traditional solutions (interpreters etc.) expensive, not available on demand; or (amateurs) unsuitable
- Focus on spoken language translation (e.g. Medical SLT workshop at NAACL) is good, but perhaps too narrow

Pathway to Healthcare

Initial advice seeking

Making an appointment

Providing general background information

Doctor seeks information

Doctor-patient consultation

Doctor explains pro-/diagnosis

R_x

Procedures with nurse

Follow-up visits

Different users, different scenarios

- Patient must communicate with …
  - Receptionist
  - Paramedic
  - Doctor
    - GP
    - Specialist
  - Nurse
  - Pharmacist

Healthcare provider

Role of language in pathway to healthcare

Initial advice seeking

Making an appointment

Gathering background information

Doctor-patient consultation

At the pharmacist

Procedures with nurse

Follow-up visits

Information retrieval/QA

Cooperative task-based dialogue

Form-filling

Multi-purpose dialogue etc

Reading instructions

Following instructions

Any of the above

- Do we want a single device for all these scenarios?
- Who is the principle user of the device(s)?
  - Healthcare providers will see many patients with differing levels of LEP, and of course different native languages
  - Viewed from patient's perspective, there is more consistency

Assumed profile of users

- Assumption that one of users is a healthcare provider
  - L1 user may be more or less educated, qualified, medical: doctor, nurse, pharmacist, receptionist, orderly, etc.
- Assumptions about who initiates and controls the dialogue and therefore who controls the software
  - Transonics: assumes the doctor wants to maintain control, has sole access to the controls, has greater technological familiarity

Users should "share" the tool

- "Patient-centred" medicine (Stewart et al. 2003)
- side-by-side rather than face-to-face
- use of computers can be positive (Mitchell & Sullivan 2001) despite doubts
- some patients (and doctors) may be suspicious or timid faced with unfamiliar technology, but our experience is that many aren't

LT implications

- Spoken language translation
- Text translation
- Multilingual information extraction
- Text simplification
- Computer-based interviewing
- Speech recognition
- Speech synthesis

All of these typically for under-resourced languages

Spoken Language Translation

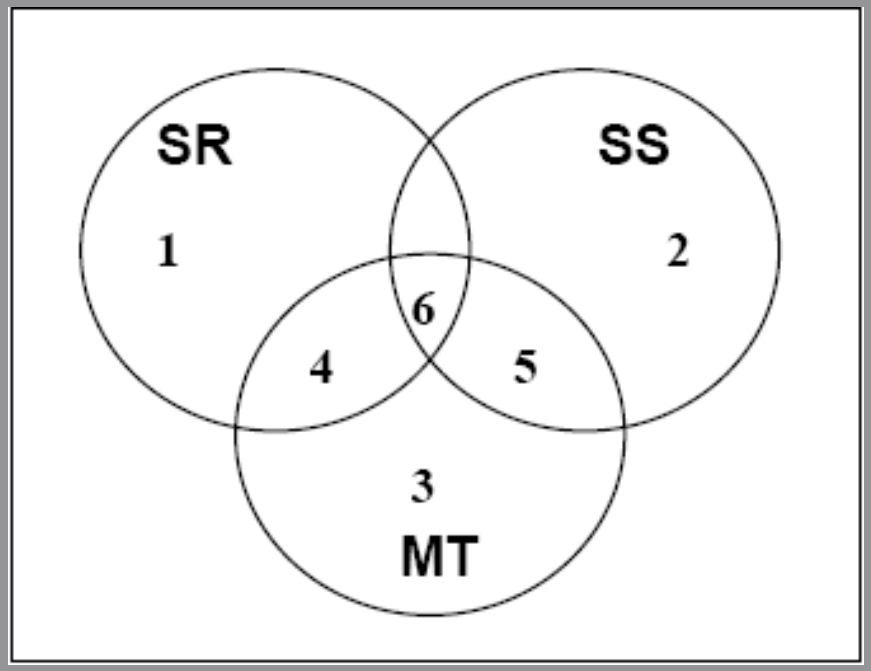
- Historically focus has been on task-oriented dialogues
- Doctor-patient dialogues is an "obvious" application
- Several dedicated research efforts
  - Languages covered include both "major" and "lesser" languages (Farsi, Pashto, Thai)
  - Medical SLT workshop at HLT/NAACL 05
- Some reports of "pipeline" systems

Pipeline SLT

- Concatenate commercially available ASR, text MT, SS
- Con: Speech is not text
- Pro: Quick and easy
- Focus on integration and user interface
- Restricted to “major” languages
- Experiments to see
  - is it usable?
  - where is the weakest link?

Pipeline SLT

- Experiment
  - Evaluate the three contributing technologies, and their combination
  - (Apart from SR): Given context, human judges asked to paraphrase what they think was said
  - Judges then score whether correct information was conveyed



- In all experiments, results suggested it was usable for this app (>85% correct interpretation)
- For J-E, MT was the weakest link
- For C-E
  - SR weakest link
  - After training, MT was weakest link

Some other approaches

- Technologies not available for less-resourced languages (LRLs)
- SLT not necessarily the best way to go
- Two examples and an aside
  - Dose labels on prescriptions
  - Lo-tech phrase-book approach to predictable dialogues
  - Faking SS and (even) ASR for LRLs

Dose labels on prescriptions

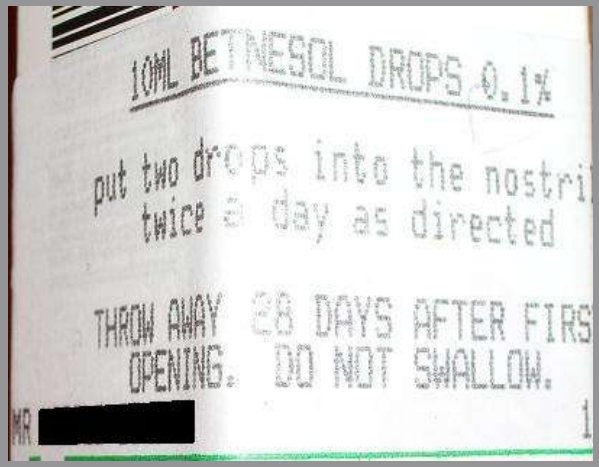
- Pros:
  - MT-friendly task (like Meteo)
  - US legislation has made availability of translation a requirement
  - Label printing is already computerized
- Cons:
  - Problem of pharmacists' legal responsibility

Dose labels on prescriptions

- If pharmacist won't provide translation, could the patient?
- Problem of inputting the source text …
- … And (if user is illiterate) reading the translation

Dose labels on prescriptions (input)

- We experimented with handheld OCR



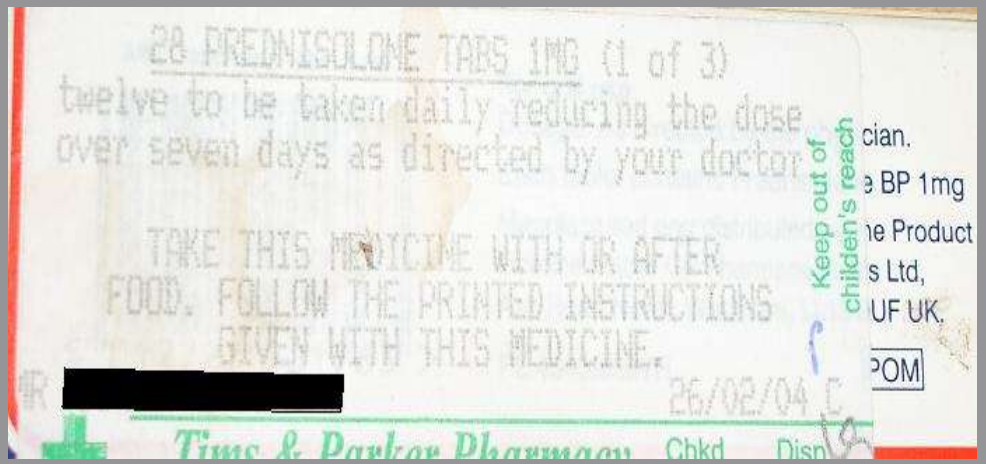
~R Cai.Dms 0.1s

put ~dr”~ into the nostrils

tWiCE jalnis directedr’

THROB QNAY OGYS N~IS-

OPENLY NOT aII@.



is. PREDN~SOL@E Teaks i~’r A1 of 3)

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li THIS ~E ~~ AFTER

e. Fa_lo* Tie)~.~~IEU INiTRU~TIO~i

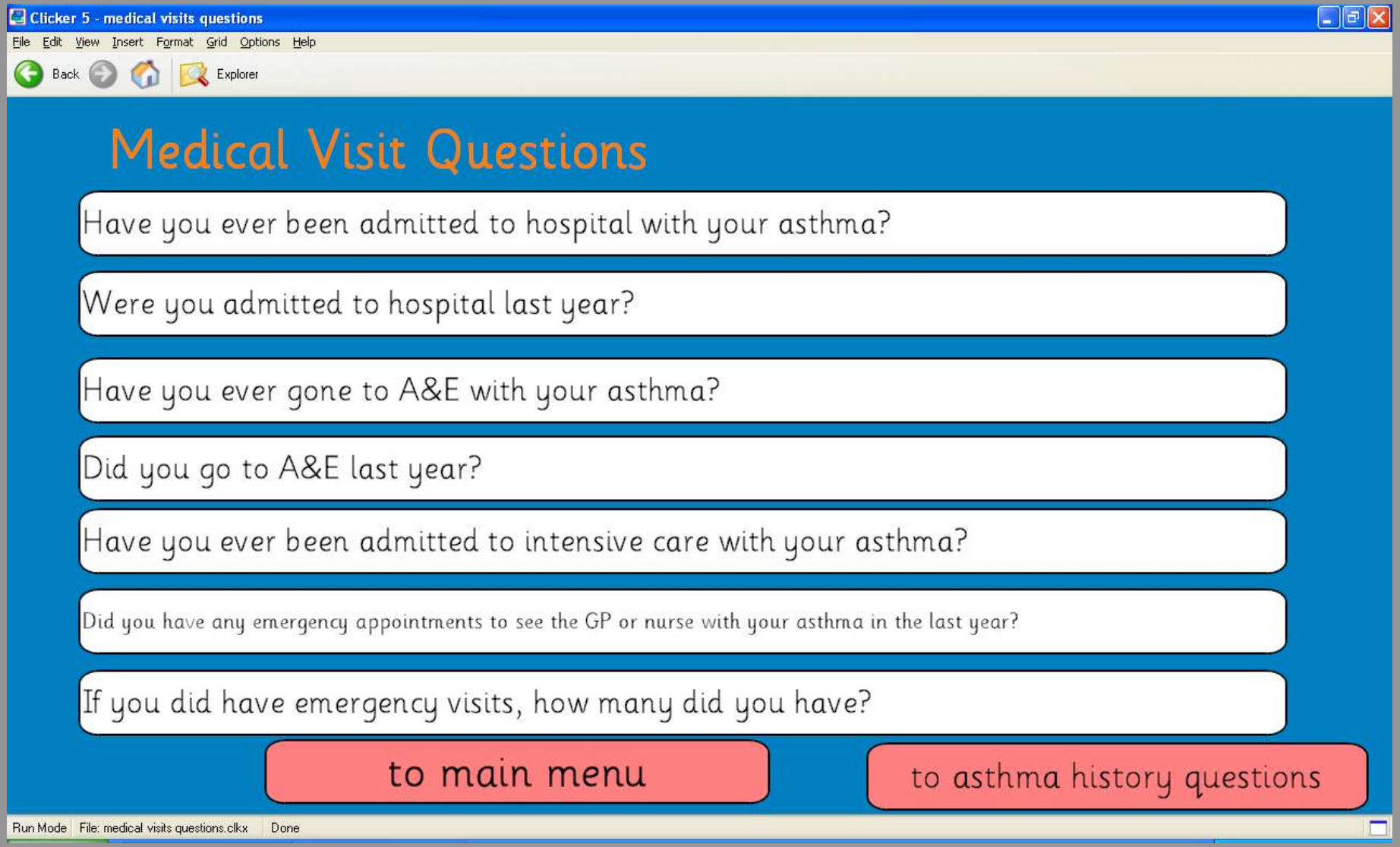
~”~ ‘ijIj’~i%::”

Dose labels on prescriptions (output)

- Talking pill boxes already exist for patients with impaired vision, or memory
- Could be used for PLEPs

Predictable dialogues: Low-tech approach

- Phrase-book approach
- Support **initial consultation** between practitioner (GP or asthma nurse) and Somali patient
- Doctor's interface is drop-down menu; selections are linked to recordings of Somali speech
- Patient's interface has pictures, text and recorded speech
- We have piloted two variants:
  - lap-top with mouse pad
  - tablet PC with stylus


Clicker 5 - medical visits questions
File Edit View Insert Format Grid Options Help
Back
Explorer
Medical Visit Questions
Have you ever been admitted to hospital with your asthma?
Were you admitted to hospital last year?
Have you ever gone to A&E with your asthma?
Did you go to A&E last year?
Have you ever been admitted to intensive care with your asthma?
Did you have any emergency appointments to see the GP or nurse with your asthma in the last year?
If you did have emergency visits, how many did you have?
to main menu
to asthma history questions
Run Mode
File: medical visits questions.clkx
Done

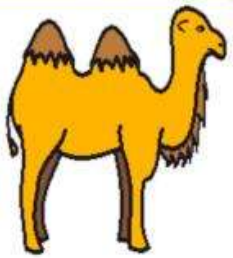
Clicker 5 - If yes, what type of animal did you own in Somalia (1)

File Edit View Insert Format Grid Options Help

Back Explorer

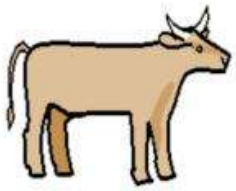
haddii aad tidhi haa, noocee ayaad ku haysan jirtay?

point to your answers

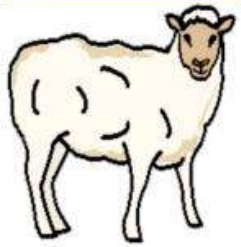


geel
camel

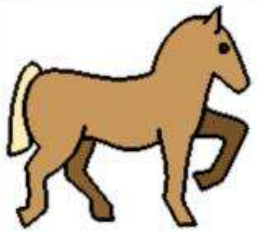
riyo
goat



lo
cow



ido
sheep



fardo
horse

ku celi
repeat the question

0

midnaba
none of these

su'aasha labaad
back to owning pets menu

Run Mode | File: If yes, what type of animal did you own in Somalia (1).clkx | Done

start | Mail :: Inbox - Micros... | Clicker 5 - If yes, wh... | Norton | 16:49

Results

- 26 consultations
- 9 clinicians
- High satisfaction …
- … Except where dialogue involved going off-script

	VS	S	other	%
Size of symbols (P)	25	1	0	100
Size of symbols (C) N=9	5	4	0	100
Size of text (P)	23	1	2	92
Size of text (C) N=9	4	5	0	100
Range of questions (P)	25	1	0	100
Range of questions (C) N=9	1	7	1	89
Range of responses (P)	21	3	2	92
Range of responses (C) N=9	3	5	1	89
Using laptop (P) N=14	3	3	8*	43
Using tablet (P) N=12	7	4	1	91
Using mousepad (P) N=14	3	3	8*	43
Using stylus (P) N=12	9	3	0	100
Navigation (P)	11	9	6*	77
Navigation (C)	14	12	0	100
P's ability to use device (P)	8	12	6*	77
P's ability to use device (C)	12	9	5*	81
C's ability to use device (P)	26	0	0	100
C's ability to use device (C)	9	15	0	100
P understand C's questions	23	3	0	100
C understand P's responses	10	13	3	88
P answer C's questions	22	4	0	100
C elicit information	12	11	3	88
Make self understood (P)	22	4	0	100
Make self understood (C)	8	15	3	88
P explain worries to C	11	4	1	96
C elicit P's worries	7	4	13	42
Build a relationship (P)	22	1	3	88
Build a relationship (C)	7	11	8	69
Better than no interp. (P)	22	3	1	96
Better than no interp. (C)	14	8	4	85
P satisfied with review	25	1	0	100
C achieved desired outcome	11	6	9	65

Reliance on text with illiterate users

- Crucial to all applications is SS and perhaps ASR
- Not available with less-resourced languages
- We have experimented with “fake” SS …
- … and even fake ASR

Faking Speech Synthesis

- Understandable speech can be generated using SS system for sufficiently similar language
  - "Similar" in phoneme set, doesn't have to be a related language
  - E.g. We used German for fake Somali SS
- Key is whether or not it is "usable"
- i.e. better than nothing !

Faking ASR

- Much harder, but …
- If situation is sufficiently controlled, we can get acceptable performance
- We successfully used English ASR to recognize spoken Urdu
  - NOT speech-to-text, but identification of correct answer from a choice of 2~6 alternatives
  - Of course this is an easier task!

Conclusions

- Apologies: not much of this is MT
- My point is
  - MT is not necessarily the best solution
  - Even where it is, full SLT may not be necessary
  - Where it is, there are problems with less-resourced languages
- Bottom-line: research should be problem-oriented, not technology-oriented