Reading List

  – 21. **Translation by Structural Correspondences.** Kaplan, R. *et al.*
  – 22. Pros and Cons of the Pivot and Transfer Approaches in Multilingual Machine Translation. Boitet, C.
Tomorrow's Soldier Today
Robot soldiers! Bird-sized airplanes! The Phraselator! At DARPATech, the military shows off its coolest gadgets.
By Phillip Carter
Posted Thursday, March 11, 2004, at 2:23 PM PT

Some of the displays show DARPA success stories—projects conceived by the research agency that have actually made it into production. One example is the Phraselator, a brick-sized one-way translation device designed for use by U.S. soldiers in countries where they don't know the language and don't have time to learn it. Each hand-held unit uses an SD card—the same one used by many digital cameras—that store up to 30,000 common phrases useful for law enforcement, first aid, or war-fighting. To make the device work, a soldier simply says a phrase (such as "Stop at this checkpoint") into the device, and a few seconds later, the Phraselator repeats it in the chosen language—Urdu, Arabic, Pashto, and Korean are available, to name a few. So far, more than 600 of these devices have been shipped to American units in the field—including 15 programmed with Haitian dialects dispatched with U.S. troops to Haiti. (Listen to the Phraselator's Arabic mode here.)
Phraselator

DARPAASF
PHRASELATOR WINS SBIR AWARD AT 2004 DARPA Tech! ...read more

VoxTec heard your plea for a practical, cost-effective means of bridging the cross-cultural communication divide. And we pioneered the solution. The Phraselator Translation System is a voice-activated handheld system that translates predetermined phrases into the desired foreign language, allowing users to accurately convey critical information in real-time — without a human translator.

How does it work? It's simple. The user speaks or selects a phrase. The Phraselator finds the foreign language equivalent. The translated phrase, prerecorded in the desired language, is heard through a built-in high-fidelity speaker.

Combining advanced technology and the highest linguistic standards, the Phraselator Translation System boasts proven reliability, efficiency, functionality and durability.

Recent Press
- MSN Slate Gizmos: Tomorrow's Soldier Today
- Day to Day from NPR News
- TechLink: Maryland's Tech, Biotech & Telecom Mag
- Military Information Technology
- Special Operations Technology

- Time: Late-80s
- Dialogue translation differs from document translation
- Argues that the goal oriented nature of dialogues makes translation more feasible than textual translation

• Differences of Environments
  – Example of dialogues:
    • hotel reservation, conference registration, doctor-patient
  – Clear definition of information
  – Active participation of speakers and hearers
    • Writers and readers unavailable during translation

• What Should be Translated?
  – Dialogues (usually) have a purpose
  – Can define what is important and what is not
What Should be Translated?

- Example:
  - [Japanese] hotel-topic, friends-with disco-to want-to-because, Roppongi-gen be-near-nom is-good
  - [SBT] As for hotel, because I would like to go to Disco with friends, to be near to Roppongi is good
  - [English Translation] Because I’d like to go to disco with friends, I prefer to stay at a hotel in Roppongi
  - SBT = Structure Bound Translation
  - *Prefer* and *stay* not in source utterance

- Architecture of Dialogue Translation Systems
  - Extract important information from source utterances

• Examples
  – [J] Roppongi-gen be-near-gen hotel-nom good is
  – [SBT] A hotel near to Roppongi is good
  – [J] Roppongi-around-gen hotel-acc please
  – [SBT] A hotel around Roppongi, please
  – [J] Hotel-topic roppingi-no be-near-nom good is
  – [SBT] As for hotel, to be near to Roppongi is good
  – [J] be-convenient-topic roppongi-to near hotel is
  – [SBT] What is convenient is a hotel near to Roppongi
Tsujii, J.-I. And M. Nagao

- Dialogue translation system need not understand utterances completely, just the important bits
  - Need not translate fluently the unimportant bits

- Real world knowledge
  - Roppongi is a special region in Tokyo where many discos exist
  - In order to go to some place, it is preferable to stay at a hotel near to the place

- Active Participation of Speakers and Hearers
  - Translation of dialogues allows for questions from user when translation does not supply necessary information or when translation cannot be understood
  - Also permits system to ask clarification questions
  - Example
    - [E] In which region do you want to stay in Tokyo?
    - [J] Disco-to want-to-go
    - [System] The question is ‘in which region do you want to stay in Tokyo?’ Would you specify the place which you prefer to stay?

- Lexical-Functional Grammar (LFG)
- Claim: Modularity
  - Modularity of linguistic specifications
    - Not a single level that connects two languages
    - Instead, simultaneous correspondences
  - Permits contrastive transfer rules that depend on but do not duplicate the specifications of independently motivated grammars of source and target languages

- A General Architecture for Linguistic Descriptions
  - LFG
    - c-structure (constituent)
    - f-structure (grammatical function)

Figure 21.1

- A General Architecture for Linguistic Descriptions
  - LFG
    - c-structure (constituent)
    - f-structure (grammatical function)
    - Semantic structure

Figure 21.2

• Examples
  – Change in grammatical function
    • (German) Der Student beantwortet die Frage
    • (French) L’étudiant répond à la question
  – Transitive verb in German, intransitive verb with an oblique complement in French

(7) \textit{beantworten} \quad V
(↑ PRED) = ‘beantworten \langle(↑ SUBJ)(↑ OBJ)⟩’

while the transfer lexicon for \textit{beantworten} contains the following mapping specifications:

(8) \begin{align*}
(τ↑ PRED FN) &= \textit{répondre} \\
(τ↑ SUBJ) &= τ(↑ SUBJ) \\
(τ↑ AOBJ OBJ) &= τ(↑ OBJ)
\end{align*}

We use the special attribute FN to designate the function-name in semantic forms such as ‘beantworten \langle(↑ SUBJ)(↑ OBJ)⟩’. In this transfer equation it identifies \textit{répondre} as the corresponding French predicate. This specification controls lexical selection in the target, for example, selecting the following French lexical entry to be used in the translation:

(9) \textit{répondre} \quad V
(↑ PRED) = ‘répondre \langle(↑ SUBJ)(↑ AOBJ)⟩’

• Example
  – Differences in control
    • The student is likely to work
    • It est probable que l’étudiant travaillera
    • Infinitival complement of a raising verb is translated into a finite clause

\[
\text{likely} \quad \text{A} \\
(\uparrow \text{PRED}) = '\text{likely}\langle (\uparrow \text{XCOMP})\rangle (\uparrow \text{SUBJ})' \\
(\uparrow \text{SUBJ}) = (\uparrow \text{XCOMP SUBJ})
\]

\[
\text{probable} \quad \text{A} \\
(\uparrow \text{PRED}) = '\text{probable}\langle (\uparrow \text{COMP})\rangle (\uparrow \text{SUBJ})' \\
(\uparrow \text{SUBJ FORM}) = \text{il} \\
(\uparrow \text{COMP COMPL}) = \text{que} \\
(\uparrow \text{COMP TENSE}) = \text{future}
\]

\[
(\tau \uparrow \text{PRED FN}) = \text{probable} \\
(\tau \uparrow \text{COMP}) = \tau(\uparrow \text{XCOMP})
\]

Figure 21.6

- Differences in Embedding
  - The baby just fell
  - Le bébé vient de tomber

(21) \textit{just} \text{ADV} \ (\uparrow \text{PRED}) = \textit{‘just }\langle (\uparrow \text{ARG})\rangle\textit{’}
\[ (\tau\uparrow \text{PRED FN}) = \text{venir} \]
\[ (\tau\uparrow \text{XCOMP}) = \tau(\uparrow \text{ARG}) \]

f-structure for S

\[
\begin{align*}
\text{PRED} & \quad \left[ \text{PRED} \quad \text{fall}([\text{baby}]) \right] \\
\text{TENSE} & \quad \text{past} \\
\text{SUBJ} & \quad \left[ \text{PRED} \quad \text{baby} \right] \\
\text{ARG} & \quad \left[ \text{DEF} + \right] \\
\end{align*}
\]

f-structure for ADV

\[
\begin{align*}
\text{PRED} & \quad \left[ \text{PRED} \quad \text{fall}([\text{baby}]) \right] \\
\text{TENSE} & \quad \text{past} \\
\text{SUBJ} & \quad \left[ \text{PRED} \quad \text{baby} \right] \\
\text{ARG} & \quad \left[ \text{DEF} + \right] \\
\end{align*}
\]

Figure 21.10

Figure 21.11

Figure 21.12