

Amusing Tools for Teaching Lesser-Loved Languages

Peter Juel Henriksen

DanCAST (Danish Center for Applied Speech Technology)
Copenhagen Business School
Copenhagen, Denmark
peter@homunculus.dk

Abstract—TALERUM is an interactive 2nd language learning environment, designed for use throughout the vast and sparsely populated West-Nordic area where Danish is taught as a foreign language (and for historical reasons, not always a popular one). In a town-like environment, the pupil moves between shops, schools, cafes and a home base where the session begins and the pupil is received as an exchange student by the parents of her ‘roomy’. Through user-initiated dialogues with the game characters the pupil learns about her *secret mission*. Talerum thus uses elements of informal dialogue, game logic and relatively deep semantic analysis to keep the attention of the language student of generation IT. The Talerum software is open code, and the application is portable to other language locales. An English version is in preparation.

Keywords—Computer assisted language learning (CALL); dialogue systems; gaming

I. BACKGROUND

Developed in 2015-2017, Talerum is the newest member of the suite of training tools for young language students developed and user-tested by the research group FRASAR. The entire suite is hosted by Iceland University¹. The Frasar group consists of Nordic computational linguists and educationists, reaching out to language pupils and teachers in the vast and thinly populated West Nordic area (Greenland, Iceland, the Faroe Islands) where Danish is taught as a foreign language (L2 or L3). The Frasar tools target the productive aspects of language learning, especially Danish vernacular as used in everyday situations (greetings, friends’ conversations, small talks, negotiations with shop attendants, etc.). The tools are browser-based and combine gaming elements, dialogue templates, spoken language exercises, jokes, music, puzzles and interactivity to stimulate language awareness and prepare the pupil to meet the Danes. See [2], [8] for discussions on computer gaming as a strategy in foreign language teaching with special regard to interaction and productive skills.

II. TALERUM

At FTC2017 we will demonstrate Talerum for the first time outside of Scandinavia. Talerum (literally “Talk rooms”) is probably the most ambitious Frasar tool, offering a free-style exploration of a virtual suburb with malls, shops, cafe, school, and a home base. The overall layout of scenes and gates is seen in Fig. 1.

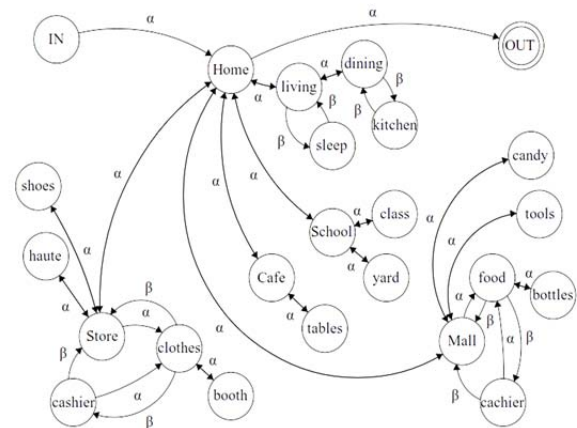


Fig. 1. Talerum scenes and gates. Sessions begin and end at the family home (state “Home”). α -gates are always open, β -gates depend on the pupil’s current game status.

As our test panel did not appreciate lengthy explanations, we decided to let our users enter the game without any systematic preparation. The typical pupil likes to first explore the game universe aimlessly for a while, then gradually uncover her task (a ‘hidden mission’ generated by the system for each new session) and finally work systematically on solving the task to earn her reward of points and praise. The task breaks up in several subtasks requiring concise and relevant Danish-language productions in a number of dialogues. While most of the Frasar tools – and computer assisted language learning (CALL) tools in general – aim at language correctness, Talerum allows the pupils to *do* things with language, such as presenting themselves to a stranger, gathering information through dialogue, negotiating with various shop attendants, and even small talk. Contrary to the majority of game-based CALL tools (see [3], [4], [7]), Talerum combines very superficial syntax analysis with relatively deep semantic evaluation. See [1] and [2] for more discussion. We also admit to being inspired by the unbeatable Larry Laffer game by Al Lowe from 1987 (the game was available online² at the time of writing).

¹ <https://taleboblen.hi.is>

² https://archive.org/details/msdos_Leisure_Suit_Larry_1_-_Land_of_the_Lounge_Lizards_1987

III. INTERACTION MODALITIES

User clicks a gate button (see Fig. 2). **Talerum** changes the scene accordingly.

User initiates or continues a dialogue with one of the game characters, e.g. “Hej, jeg hedder Emma”, *hello, I’m Emma*, or a specific request, “har du nogle blå cowboybukser i lille størrelse?”, *do you have pair of blue jeans size small?* **Talerum** returns an affirmative or negative answer, or asks for clarification (in case of uninterpretable input or insufficient information).

User clicks on an earlier phrase. **Talerum** plays back the phrase in speech synthesis (mimicking the prosodic style of Danish vernacular with high speech rate, rich phonetic reductions, and falling contour).

User clicks the help button. **Talerum** provides context-relevant information, be it linguistic assistance (Danish phrases and terms, with translations in the pupil’s L1) or clues to the secret mission (e.g. “I Danmark betaler de fleste med Dankort”, *In Denmark, most people use the paycard called Dankort*, suggesting the user to search for and collect her card).

IV. ENVIRONMENTS, GATES AND SCENES

There are five main environments in **Talerum**: a home base, a departments store, a food court, a cafe, and a school (depicted in Fig. 1 as Home, Store, Mall, Cafe, and School, respectively). Each environment serves as a hub giving access to a system of interconnected scenes (lower-cased in Fig. 1). Some of the scenes are dynamic while others are static. Passing through a static scene doesn’t actually contribute to the user’s mission, but the scenes are nevertheless appreciated by our child testers, adding to the ‘suburb realism’ with alleys, cozy corners, and dead ends.

The dynamic scenes, in contrast, are where the dialogues take place, potentially promoting the global mission. The most significant interactions take place in the home environment (living room, kitchen, sleeping room), the clothing shop SuperChik (Fig. 2), and the food market. SuperChik deals with vintage fashion items (popular in Copenhagen), and the pupil acts as a customer inquiring about various items, specifying her wishes, asking quality and price, and so on. She may even change her description during the conversation, or ask questions not relating to the merchandise (e.g. “Hvad er klokken?”, *What time is it?* or “Hvor bor du?”, *Where do you live?*). **Talerum**’s replies are generated by a combination of strategies including canned phrases (“Hvad skulle det være?”, *Can I help you?*), proposition templates (“Vi fører desværre ikke X”, *Sorry, we don’t sell X*), and thoroughly compositional constructions.

As seen in Fig. 2, dialogue pages keep track of the three most recent turns. The user input “Dig før: en blå kjole” (*You before: a blue dress*) quotes the pupil and also links to the text-to-speech playback. The following phrase is the attendant’s turn, in the case at hand describing a particular dress. The third phrase “Din tur: ja tak, den tager jeg” (*Your turn: Yes please, I’ll take it*) was entered by the user most recently and not sent yet.



Fig. 2. SuperChik, a second-hand clothing shop in the Department Store environment.



Fig. 3. The cashier’s desk. Access to this scene requires an item in the pupil’s shopping basket. Exit from this scene to the Department Store’s main hall requires a successful payment.

At this point, clicking “Sig det!” (*Say it!*) will have the effect of a classical speech act, the attendant acknowledging the sale and transferring the item to the pupil’s basket. If the action is successful, the gate panel (on the right side) changes accordingly replacing gate “Megazin” (straight passage to the lobby) by a new gate “Kassen” (*Cashier*; Fig. 3). Of course, you cannot leave the store with unpaid goods in your basket.

V. TALERUM’S DIALOGUES: AN EXAMPLE

User: Hej, kunne du vise mig hvad I har i sandaler.

[*Hello, could you show me some sandals*]

Clerk: Vi har slet ikke fodtøj, desværre. Andre ting?

[*Sorry, we don’t sell footwear; anything else?*]

User: Nå, så ville jeg gerne se på nogle bukser.

[*Well, I’d like to see some trousers then*]

Clerk: Vi har flere slags, noget særligt du vil have?

[*We have several kinds, what would you like?*]

User: Blå, tak, og helst af ren bomuld.

[white would be nice, and made of pure cotton]

Clerk: Kan du lide den her, en lækker blå bomuldsbuks til 159, i størrelse medium?

[What about these blue jeans at 159, size medium?]

User: Hvor kan jeg prøve dem?

[Where can I try them on?]

Clerk: Prøverummet er lige her ved siden af os

[Absolutely, the booth is right next to us]

User: [coming back] De er lidt for store

[They're a bit too large]

Clerk: Nå, hvad så med denne her, en smart blå bomuldsbuks i small, til kun 119 kr?

[What about these nice blue jeans, size S, at only 119?]

User: OK, dem tager jeg.

[Yes please, I'll take them]

Clerk: Tak for det. Du går bare i Kassen og betaler.

[Thank you; you can pay at checkout].

VI. SEMANTIC EVALUATION

Dialogues in the Home environment proceed through a sequence of preplanned discourse states (in a finite state layout) where each production may or may not allow a step forward. Unless the user takes the initiative and pushes for more information, the dialogue will tread water indefinitely remaining within the same discourse state. Only as the final state is reached, the essential pieces of information are released by the Talerum interlocutor (one of the members of the pupil's host family).

In contrast, dialogues in the shops and stores are entirely user-driven and are not confined by a fixed discourse scheme (see section V). Talerum's response generator uses inference-based methods, and the derived discourse information is accumulated as long as the dialogue proceeds, enabling the use of anaphoric reference, incremental specification of requirements and offers, re-negotiation of details and as mentioned before, even off-topic comments and inquiries.

The response generator takes as input 1) the user's current production (normalized by filtering out irrelevant tokens and most function words); 2) a bag of propositions representing the overall discourse state (possibly containing contradicting data after re-negotiation, e.g. "medium size" and "smaller than medium size", the freshest information being prioritized); 3) the *universe* or global set of items in the shop; 4) a no-go list of items already sold or rejected by the user; and 5) a focus item (defined only when a particular item is under negotiation). Based on the user input, the response generator delivers a type-logical expression representing Talerum's response. The expression is mapped to a natural language phrase reflecting its semantic type: a yes/no-question (e.g. "Kan du lide den her?", *Would you like this?*), a material question ("Hvad kan jeg ellers gøre for dig?", *What else can I do for you?*), an assertion ("Vi har ikke andre bukser i den

størrelse", *We don't other trousers in your size*), or a boolean (such as "Nej, desværre ikke", *No, sorry*, or "Ja tak", *Yes please*).

The inference-based parts of Talerum is written in Prolog (a programming language suitable for logical reasoning) while the linguistic and client-server related parts are in Perl, Python and Linux-shell. Client-side code is html5 (using JavaScript and css). The program complex is based on independent functional modules, and most modifications thus require only local changes, for example, installing new commodity types, defining new derivation rules for the secret challenge, adding new scenes and gates between them, expanding the repertoire of phrases and phrase templates, and so forth. Even porting Talerum to a new language locale is done by rewriting a single program module (the phrase database called by the response generator) and replacing the Danish dictionary (containing the recognized word forms and part-of-speech annotation).

VII. THE CHALLENGE

Talerum was developed under the auspices of our child users. At first, they enjoyed moving around aimlessly, trying their hand at Danish conversation without any particular purpose in mind. However, most lost interest before long, which is why we installed the hidden challenges (renewed in each session). Through dialogues with the members of your host family, you gradually uncover the details of your current mission, eventually sending you into town to obtain something (for instance, a birthday present) to someone's relief or surprise.

By way of an example, your hidden task could be to buy the perfect gift for your roomy (called *Ida* for girl users and *Emil* for boys). But how will you discover the fact that today is *Ida's* birthday and, in turn, learn the details of her birthday wish? How will you find the thing, let alone pay for it? Finding the answers you need depend on your conversation skills, improving for each session you do.

Completing your task earns you an acknowledging comment (depending on your performance) and also an update of your Talerum profile with regard to current proficiency level and global rank.

VIII. LATEST DEVELOPMENTS

Since our first publication on Talerum [10], we have received detailed feedback from a total of 14 pupils from two school classes in Greenland (4 girls, 3 boys) and Iceland (4 boys, 3 girls), all aged 11-14.

While these early results don't allow statistically solid conclusions, the comments we received were sufficiently consistent for us to improve on two aspects in particular, prior to our large-scale test sessions beginning in September 2017. Since we believe that both of these aspects could be an inspiration to CALL developers in general, we include a discussion below (these points have not been presented publicly before).

Firstly, for the generation and administration of the hidden challenge we adopted a more 'psychological' style. In the buyer-seller dialogues taking place in the clothing store and

elsewhere, the inference system (representing the seller) now deliberately suggests items that are consistent with the pupil's specifications (the buyer), but at the same time inconsistent with respect to the secret challenge; for instance suggesting a pair of white trousers when the roomy (celebrating her birthday) actually wants blue jeans (the birthday wish representing the challenge). This seemingly counter-intuitive strategy shows to greatly improve the entertainment value, rewarding the user who has taken pains to interview her roomy thoroughly, and at the same time preventing lucky shortcuts where the lazy gets an easy hit. This improvement to the game logic alone made our 14 test pupils spend, on average, 58% more time (in terms of dialogue turns) in each session, more than half of them reporting back a more pronounced feeling of fairness. This figure was consistent across genders as well as nationalities (amount of turns per session increased by 44%-68% in each of the four gender/nationality segments).

Secondly, we included a more versatile small talk administration in the dialogue system. For instance, a number of off-topic threads are now supported, allowing the user to chat leisurely with the shop attendants before returning to the main track (we also adjusted the score calculation so as to not punish such detours). Examples are:

- Asking the time, date, year, location, way to the toilet, etc.
- Conversing about the weather.
- Asking name and address of the attendant, inviting out—or home (the attendant will always refuse, with various excuses).
- Teasing or even insulting the attendant, swearing, demanding the manager (getting a fresh reply from the attendant).

These off-topic threads are all generated Eliza-style ([9]), that is, by regular expression-based templates in simple stimulus-response cycles with no permanent changes to the discourse state (see Section VI).

Out of 14 of our test pupils (six girls, four boys) 10 reported back that they liked the new chat feature. As many as 12 tried more than one off-topic thread.

IX. CONCLUDING REMARKS

Talerum is currently being prepared for large-scale testing in public schools in Greenland, Iceland, and the Faroe Islands (pupils 10-14Y). According to the current schedule, the main

test sessions will take place from September to December 2017, involving approximately 90 pupils. The results (metadata and performance data, quantitative as well as qualitative) will be released for research purposes in early 2018 and might be interesting for comparative studies. We already know from earlier work ([5], [6]) that Icelandic and Greenlandic pupils differ greatly with regard to proficiency, degree of motivation, and linguistic challenges faced with the Danish language. The Talerum data set should considerably improve our understanding of the didactic status quo.

Since Talerum has already been well received by our test pupils, we have begun the portation of Talerum to new, more densely populated teaching scenario, for instance preparing an English language version aimed at the very young classes in the Danish public school system (age 7+).

Should any reader want to follow in our footsteps, Talerum (and the Frasar tools in general) are open for testing and for use in classrooms. For conditions and practicalities, please contact the Frasar group's founder and chair Auður Hauksdóttir (auhau@hi.is). And don't hesitate to contact the author for the details of Talerum, regarding game logic, linguistic coverage, technical design, code, didactic experience, language portation issues—and anecdotes from the West Nordic culture clashes.

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