

# Interaction strategies by a non-English speaker in Dublin and their relation to Machine Translation

Nikiforos Karamanis  
Department of Computer Science  
Trinity College Dublin  
Ireland  
nikiforos.karamanis@cs.tcd.ie

Saturnino Luz  
Department of Computer Science  
Trinity College Dublin  
Ireland  
luzs@cs.tcd.ie

## ABSTRACT

This paper presents a fieldwork study of everyday interactions which appear to be relevant to the development of interactive Machine Translation systems. These interactions accompany activities by a person who lives in Dublin but does not speak much English. Performing seemingly simple activities such as shopping or taking the bus is shown to require a certain amount of preparation in order to make subsequent interactions predictable. When unexpected challenges arise, translation turns out to be one of several options: communication can also be accomplished via artefacts (e.g. by handing in a banknote) or avoided altogether when this is considered more convenient. A translator might be employed on occasion but accomplishing everyday activities do not seem to depend only on this. In fact, such interventions seem to contribute more to familiarising one with the context of the interaction than to improving their language skills.

We comment on the mismatches between our analysis of such everyday life activities and the scenarios which tend to underlie the development of Machine Translation systems and conclude by identifying some promising directions for future work.

## Categories and Subject Descriptors

H.5.0 [Information interfaces and presentation (e.g., HCI)]: General; I.2.7 [Natural Language Processing]: Machine Translation

## General Terms

Human Factors

## Keywords

Qualitative research methods, systems design

## 1. INTRODUCTION

Machine Translation (MT), that is, the use of computers to automate translation from one language to the other [5], is one of the oldest research areas in Computer Science and a subdomain of Natural Language Processing (NLP) which has experienced significant growth recently.

Like several other NLP technologies, MT is starting to be employed in interactive systems. Its applications range from speech-to-speech translation systems to tools for labour intensive localisation tasks. However, because research on MT (and more generally NLP) is mainly concerned with the development and evaluation of core technologies, there has been an emphasis on intrinsic evaluation and laboratory experiments [1], and less interest in system design and Human Computer Interaction (HCI) [9, 6].

From an HCI perspective, there has been recent interest in presenting design concepts to support collaborative tasks between users who do not share the same language using MT [8, 11, 7, 4], analysing the language of online MT-mediated communications between users engaged in such tasks [14] and further exploring the effects of MT in controlled experiments [15, 13]. In all these cases, the tasks are defined by the researchers and there is little opportunity for the participants to engage in activities which are really meaningful to them and relevant to their everyday life.

HCI has increasingly looked at the impact of technology in context, in order to understand the factors shaping its use, and also to directly inform design. In this paper, we look at activities in a natural setting although we refrain from subscribing to a particular school of thought (e.g. Ethnomethodology [3, 2]) for conducting qualitative research. Thus, our approach is representative of the “flexible” framework for data gathering and analysis discussed e.g. in [10].

We explore everyday life situations to which MT appears relevant by providing “instances” of activities by a person who needs to communicate with others without fully speaking their language. Our aims are to: (a) motivate the application of qualitative research methods for the design of systems which involve MT (b) present examples of real interactions which are relevant to designing such systems and (c) discuss the implications of these observations and point to promising directions for future work.

## 2. MT IN REAL LIFE

In their discussion of potential uses of MT, [5] present the following scenario:<sup>1</sup>

“Suppose this morning you saw some lovely plátanos (plantains, a kind of banana) at the local Caribbean grocery store and you want to know how to cook them. You go to the Web and find the following recipe: [...] An MT engine (we run this through Google in early 2008) produces the following translation: [...] While there are a lot of confusions in this translation (Is it for bananas or plantains? What exactly is the pot you should use? What is *bañarlos*?) it’s probably enough, perhaps after you look up one or two words, to get a basic idea of something to try in the kitchen with your new purchase.”

Speech-to-speech translation systems (i.e. applications which incorporate MT with speech recognition and synthesis) are also considered appropriate for “predictable, re-occurring scenarios” such as those faced by travelers in a foreign country. A device developed to assist tourists with hotel reservations during the 2008 Olympic games is thought to provide “greater flexibility”, “a more convenient and natural interface” as well as “more sophisticated functionality” compared to “an old fashioned phrasebook” [12, p.299].

While such examples express the vision of NLP researchers and an opportunity to showcase novel technologies, do they correspond well to actual instances of use? As the cited work (and indeed most of the literature in MT) focuses on the development of individual components and their intrinsic evaluation precise answers to this question are hard to find. Representative uses of MT in real life are also missing from the publications which appear in HCI venues [8, 11, 7, 4, 14, 15, 13]. An additional question arises: Can certain tasks for which translation appears necessary actually be accomplished without it?

Looking at activities in a natural setting appears to be an appropriate way to answer such questions. As a first step towards this direction we collected data using various qualitative methods (diaries, interviews and observations) as discussed in the next section in more detail.

## 3. GETTING BY WITHOUT ENGLISH

The following are instances of everyday activities by George, the subject of this study. George is male and in his early 50s. He lives in Dublin with his two children (about 30 years old each) and teaches bilingual children in his native language. The study took place between February and April 2009 about 6 months after George moved to Dublin for this job. His daughter has been living in Dublin since 2001 and his son since 2005. George had visited them several times before he moved.

George’s speech includes some English words uttered in isolation (e.g. “yes”, “thanks”, etc) or in short “standardised”

<sup>1</sup>We do not include the actual recipe in Spanish and the English translation for the sake of brevity. These can be found in [5, p.897].

phrases (e.g. “one Heineken please” when ordering in the pub).<sup>2</sup> In essence, George lives in a country in which English is the predominant language but his knowledge of English is very basic. So the question arises: How does he get by?

To answer this question, we asked George to keep a diary of his everyday activities for two weeks, particularly those which may require him to interact with people who do not speak his language. This gave rise to 13 descriptions of activities. George elaborated on the diary entries during two informal interviews each of which lasted for about 45 minutes. This was followed by direct observations of two frequently reported activities (namely, shopping and ordering in the coffee shop) which took place on the same day in three different locations and lasted for about one hour. Then, George commented on the observed activities and provided additional background about his life in another informal interview which lasted for another hour.

We opted for a framework for data gathering and analysis which emphasises triangulation without committing to a particular theory. In our analysis, we paid particular attention to the ways George prepared himself for his everyday activities and the strategies that he developed to get things done (including use of artefacts and whether he turns to his children for translation). We focused on events which appeared unexpected to us but revealed actions with a particular meaning in the situations that he was engaged in. We were also interested in any unanticipated challenges he might be facing and whether lack of fluent English eventually prevented him from accomplishing the intended tasks.

Shopping is one of George’s favourite activities and is frequently mentioned in his diary. As he explained in his interviews, he lives close to the shopping centre and goes shopping almost every day, sometimes more than once per day. He goes to different shops to buy different things and knows where everything is in the shelves (“I find them blindly”). At the cash register, he tries to get a glimpse of the amount to pay. This is not always possible so he normally carries a 20 or 50 euro note. As he usually buys just a few things, this tends to be enough to cover his shopping costs.

George has spent time preparing himself for the shopping activity (by learning where to find the things that he needs) and has developed strategies (e.g. carrying the banknote) which make related interactions as smooth and predictable as possible. However, things do not always go according to plan, as the following instance from our direct observation indicates:

George (GE) is in the supermarket and is waiting in the queue to pay. He points to the self-check tills and says: “[NE]<sup>3</sup> I can’t go there with the machines”. Shortly, afterward the assistant (AS) from these tills calls him:

**AS:** “next”

<sup>2</sup>In his diary, English words and phrases are spelled using his native (non-Latin) alphabet.

<sup>3</sup>NE (Non-English) indicates speech or text in George’s native language which has been translated by the first author.

**GE:** “no, no English”

**AS:** “I will help you” [AS scans shopping and places it on the till’s scale; GE tries to move some packs from the scale to his bag.]

**AS:** “leave over there for a second”

**GE:** “OK, OK, OK ...” “[NE] they must stay down”

**AS:** “just one second” [AS scans shopping]

**AS:** “do you have a card?”

**GE:** “OK”

**AS:** “no?”

**GE:** “card?”

**AS:** “card” [points to her own shopper’s loyalty card; GE laughs and gives his loyalty card to AS; AS keys in card code]

**AS:** “thank you” [hands back card]  
[GE tries again to put shopping in his bag.]

**AS:** “leave over there please”  
[GE hands in 50 euro note]

**AS:** “take your money” [AS points to change]  
“thank you very much”

**GE:** “thanks” [laughs]

Interacting with the shopping assistant is a challenge for George since it requires him to communicate in ways that he has not been prepared for. Noticeably, language is not his primary means for understanding and responding to her requests (e.g. to leave the shopping on the scale or to hand over his loyalty card) but these can be addressed easily using social and visual cues. Using familiar strategies (use of the banknote) and a few isolated English words also helps him go through the interaction rather smoothly. Even though George was initially caught by surprise and had to engage in an unanticipated interaction, he can get things done without an obvious need to resort to translation.

On other challenging occasions, George simply avoids engaging in an interaction when this is considered more convenient:

George is in the Asian market. He is looking for spinach in the vegetable section but does not see any. He says “[NE] I will come again later, here is the solution: I avoid it” [i.e. asking].

Ordering in the coffee shop or the pub is another activity that George can accomplish without resorting to translation. His diary entries show that this can be achieved with standard phrases (e.g. “one Heineken please”) and the use of the banknote (as in the supermarket) for paying without having to engage in extensive conversation, something that was confirmed by direct observation.

Another frequently reported activity is going around by public transport. Similarly to shopping, accomplishing these everyday actions also requires preparation. When George

goes somewhere by bus for the first time, he normally travels with someone else. He is less concerned with learning “useful phrases” in English in order to communicate directly. What seems to be more important is to become acquainted with the context of the activity (including the layout of the supermarket, the bus route, etc).

In the taxi, he keeps the destination address as a draft SMS in his mobile phone and shows it to the driver. Translation is required in exceptional circumstances:

“[NE] I had to get a taxi to go somewhere. Because I did not know the address or how to say this to the cab driver, when I got in the taxi, I called my daughter and she spoke to the driver and told him where to go. When I got there, the driver kept one euro more than what the meter wrote. I did not say anything but in the evening when I talked to my children they told me that this is how it is done because they charge one euro more for each person who enters the cab.”

In this instance, George uses his daughter as a “translator” because he does not know the destination address. This strategy is employed exceptionally and not as his standard way for accomplishing the everyday activity of using public transport. Similarly to the second shopping instance above, he avoided interacting with the driver about the extra charge. This again shows that George resorts to translation selectively but does not deal with every challenging or each everyday situation in that way.

In his interviews and diary, George mentions a few other occasions in which his children helped him (checking-in at the airport, going to the bank to inquire about a transaction, understanding an email sent to him in English by his air carrier, etc). Similarly to the taxi instance above, intervention by translation seems to apply to activities which do not occur very frequently. Moreover, his children are not simply helping him to get things done in these occasions. Their intervention also aims to enable George to act on his own in the future by familiarising him with the context of the interaction. Similarly to the everyday activities of shopping and using public transport, preparation is paramount even for less frequent situations and more emphasis is given in introducing him to the situational context rather than enabling him to engage in a conversation.

#### 4. CONCLUSIONS

In this study we identified instances of real life in which George, a person who does not speak much English, accomplishes everyday tasks in a country in which English is the predominant language without resorting to translation. Performing seemingly simple activities such as shopping or using public transport is shown to require a certain amount of preparation in order to make subsequent interactions smooth and predictable. His interaction strategies do not include carrying a dictionary or a phrasebook but involve “peculiar” uses of artefacts (e.g. handing in a banknote or showing an address stored in a mobile phone).

When challenges arise, these strategies are combined with

social cues and other contextually available artefacts to help George with the interaction. He may also avoid the interaction altogether when this is considered more convenient. A translator might be employed on occasion but accomplishing everyday activities does not seem to depend only on this. In fact, such interventions seem to contribute more to George's preparation by familiarising him with the context of the interaction than by enriching his phraseology in English.

These observations have certain implications for the development of systems incorporating MT. As exemplified in section 2, these systems tend to target situations in which translation appears to be missing without much consideration of other ways in which things can get done. They are also developed with the intention to provide people with more "natural" and "flexible" ways of interacting in "predictable, re-occurring" situations, which we take to correspond to our notion of everyday activities.

Our investigation of everyday activities by George stands in stark contrast with these scenarios which appear to underestimate the effort that one might invest in developing interaction strategies which do not rely much on language. Also, new devices do not necessarily come to replace "an old fashioned phrasebook" especially for tasks which can be done simply by, say, handing in a banknote.

George's strategies make extensive use of the context of the interaction and have developed naturally as the result of his concern to become familiar with this context (which is a much more prominent preoccupation to him than being able to engage in a conversation). Any technology which incorporates MT will unavoidably have to compete with these strategies. It is also unclear whether communicating with another person via an mutually unfamiliar device (e.g. a speech-to-speech translation system) will appear to be more natural or flexible to George than the strategies that he developed himself.

Another pattern which emerges from our study is that George strives for predictable and smooth interactions. This should be of particular concern for MT developers since the inherent inaccuracy of NLP technology might become a serious burden on interactions related to an everyday activity.

These are, of course, only preliminary remarks from a small scale study. Although we suggest that there are mismatches between our analysis of everyday life activities and the scenarios which underlie the development of MT, we realise that the study needs to be extended by including more participants and collecting additional data. Also, more attention needs to be paid to the situations in which translation is used in order to establish how well these correspond to the capabilities of state-of-the-art MT technology. These are our two main directions for future work. We hope that by pursuing them we will be able to provide scenarios and design guidelines for MT systems which are not just examples of showcasing technology but do indeed adhere to the reality of everyday life.

## 5. ACKNOWLEDGEMENTS

This research is funded by Science Foundation Ireland (Grant 07/CE/1142) as part of the Centre for next Generation Localisation (CNGL) at Trinity College Dublin.

## 6. REFERENCES

- [1] A. Belz. That's nice... what can you do with it? *Comput. Linguist.*, 35(1):111–118, 2009.
- [2] A. Crabtree, D. Nichols, J. O'Brien, M. Rouncefield, and M. Twidale. Ethnomethodologically informed ethnography and information system design. *Journal of the American Society for Information Science*, 51(7):666–682, 2000.
- [3] P. Dourish and G. Button. On "Technomethodology": Foundational relationships between ethnomethodology and system design. *Human-Computer Interaction*, 13(4):395–432, 1998.
- [4] C. Hu. Collaborative translation by monolingual users. In *CHI 2009*, pages 3105–3108, 2009.
- [5] D. Jurafsky and J. H. Martin. *Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition*. Prentice Hall, 2 edition, 2008.
- [6] N. Karamanis, A. Schneider, I. van der Sluis, S. Schlogl, G. Doherty, and S. Luz. Do HCI and NLP interact? In *CHI 2009*, pages 4333–4338, 2009.
- [7] D. Morita and T. Ishida. Collaborative translation by monolinguals with machine translators. In *IUI 2009*, pages 361–366, 2009.
- [8] S. Nomura, T. Ishida, M. Yasuoka, N. Yamashita, and K. Funakoshi. Open source software development with your mother language: Intercultural collaboration experiment 2002. In *HCI 2003*, pages 1163–1167, 2003.
- [9] E. Reiter. The shrinking horizons of computational linguistics. *Comput. Linguist.*, 33(2):283–287, 2007.
- [10] H. Sharp, Y. Rogers, and J. Preece. *Interaction Design: Beyond Human Computer Interaction*. John Wiley & Sons, 2007.
- [11] T. Shigenobu. Evaluation and usability of back translation for intercultural communication. In *HCI International 2007*, pages 259–265, 2007.
- [12] S. Stuker, C. Zong, J. Reichert, W. Cao, M. Kolss, G. Xie, K. Peterson, P. Ding, V. Arranz, J. Yu, and A. Weibel. Speech-to-Speech Translation Services for the Olympic Games 2008. In *MLMI 2006*, pages 297–308. Springer LNCS 4299, 2006.
- [13] N. Yamashita, R. Inaba, H. Kuzuoka, and T. Ishida. Difficulties in establishing common ground in multiparty groups using machine translation. In *CHI 2009*, pages 679–688, 2009.
- [14] N. Yamashita and T. Ishida. Automatic prediction of misconceptions in multilingual computer-mediated communication. In *IUI 2006*, pages 62–69, 2006.
- [15] N. Yamashita and T. Ishida. Effects of machine translation on collaborative work. In *CSCW 2006*, pages 515–524, 2006.