Application of Formal Ontology to Discourse Analysis and Lexical Markup in Legal Interpreting

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Abstract
We discuss application of formal ontology to the lexical markup of a legal interpreting corpus. Court proceedings in Hong Kong are conducted in English and Cantonese, with English as the legal language of record. This requires all proceedings to be translated. While interpreters are in theory supposed to be neutral conduits of language, translating only its form, the reality is that they are partners in bilingual dialogue, both clarifying and requesting clarifications to ensure the success of communication. We study clarifications in a legal proceeding corpus with the aim of discovering how prevalent clarifications are and how they may be characterized. The objective of collecting this information is to aid the education of professional court interpreters. While discourse analysis can attempt to categorize utterances, work of that sort has suffered from the inherent lack of precision and objectivity in informal classifications of speech acts that depend on human intuition of natural language words. In this work we employ a formal ontology, extending the Suggested Upper Merged Ontology (SUMO) and its mathematical definitions of speech acts. The ontology is used in the markup that constitutes a discourse analysis for the corpus, and supports objective statistics about the number and kind of clarification dialogues.

Keywords: ontology, interpretation studies, discourse analysis

1. Introduction
Translators and interpreters are intercultural professionals (Pym, 2004) who in addition to being just mediators, possess power over the form and content of the cross-cultural communication. While this power over language is recognized (Hale, 2004) in most intercultural communication scenarios, it is not explicitly acceptable in the norm of legal interpreting, despite previous research (Cheung, 2012; Jacobsen, 2004, 2008; Leung & Gibbons, 2008; Morris, 1995) which establish the active role of the court interpreter in shaping and facilitating the communication instead of simply being a passive channel of communication. However, these previous studies used mainly comparative analysis of the source and target languages on isolated case studies between English and Cantonese, English and Spanish, and English and Danish. Research findings have been difficult to replicate or compare across languages and among cases. We propose a simple empirical method which can be used to analyze corpora for comparison across different cases and languages. We develop a more objective counting and analytical engine for clarification discourse by identifying and defining the annotation attributes with respect to an existing corpus of transcripts of authentic speech, using speech act theory (Searle, 1969) to label clarification acts. A clarification is an utterance that refers in some sense to a previous utterance and either subsumes or overlaps its semantic content, in plain terms, providing a new statement that corrects an error or communicates the original idea more clearly in terms more easily understood by the listener of the original message. The frequency and pattern of clarification dialogues is believed to reflect the power hierarchy in the courtroom (Gibbons, 1999; Jacobsen, 2008). This evidence can be used to verify claims (such as in Hale, 2004) about the power of interpreters over language. We further hypothesize that interpreters are more prone to ask clarifications in Cantonese due to the issue of gender ambiguity of third personal pronoun.

The third personal pronoun in Cantonese is gender neutral, which poses a problem in interpreting into English as there is not a direct mapping in English. In (Cheung, 2012), his analysis showed that professional court interpreters in Hong Kong often “take the initiative to clarify ambiguous personal pronouns”. This may result in the higher frequency of clarifications
This further accentuated by the fact that with English being the language of official record, interpreters in Hong Kong are expected to be more careful with their English rendition and are more likely to seek clarification from Cantonese speakers. Cantonese renditions are not be recorded, so the interpreters may avoid asking for English clarifications unless it is necessary (Cheung, 2012). Interpreters also have to be careful with the number of clarifications they seek in order to safeguard their credibility (Gile, 1995). The smaller number of clarifications initiated by the interpreters in English can also be explained under Politeness Theory (Brown&Levinson, 1978). (Jacobsen, 2008) in her study of the face saving forces in the Danish court by the interlocutors, claims that interpreters are motivated to maintain silence and not to request clarification in order to save the positive face of the judges and barristers, and save their own negative face.

Most research quoted above is based on comparative analysis on the source and target language on isolated case studies. While discourse analysis can attempt to categorize utterances, work of that sort, such as the using speech act theory (Holzinger, 2004) has suffered from the inherent lack of precision and objectivity in informal classifications of speech acts that depend on human intuition of natural language words.

Our approach is to build on speech act theory but instead of using classifications that rely on human intuitions about words, we define speech acts in terms of a formal ontology, called the Suggested Upper Merged Ontology (SUMO) (Niles&Pease, 2001) (Pease, 2011) stated in an expressive mathematical logic (Pease, 2009). This makes the classifications of speech acts in the discourse analysis far more objective, and less dependent upon the peculiarities of any given human language.

2. Background: Suggested Upper Merged Ontology

The Suggested Upper Merged Ontology (SUMO) began as just an upper level ontology encoded in first order logic (Barwise, 1977). The logic has expanded to include higher order logic elements (Andrews, 2002). SUMO itself is now a bit of a misnomer as it refers to a combined set of theories: (1) the original upper level, consisting of roughly 1,000 terms, 4,000 axioms and some 750 rules. In this paper, we'll refer to this portion of SUMO as SUMO proper. (2) A MId-Level Ontology (MILO) of several thousand additional terms and axioms that define them, covering knowledge that is less general than those in SUMO. We should note that there is no objective standard for what should be considered upper level or not. We keep SUMO at about 1,000 upper-level terms with their associated definitions, and any time new content is added, the most specific content, as measured by its having the lowest level in the subclass hierarchy, is, if necessary, moved to MILO or a domain ontology. (3) There are also a few dozen domain ontologies on various topics including theories of economy, geography, finance and computing. Together, all ontologies total roughly 20,000 terms and 80,000 axioms. There are also an increasing group of ontologies which are theories that consist largely of ground facts, semi-automatically created from other sources and aligned with SUMO. These include YAGO (deMel, 2008), which is the largest of these sorts of resources and has millions of facts.

SUMO is defined in the SUO-KIF language (Pease, 2009), which is a derivative of the original Knowledge Interchange Format (Genesereth, 1999). It has been translated automatically, although in what is a necessarily very lossy translation, to OWL. We should note that unlike most ontologies, including those defined in OWL, SUMO's expressive logical language and axiomatization means that the logical definitions can stand on their own without recourse to human intuition about concept names to capture their meaning. Terms in SUMO can even be re-expressed as meaningless symbols and still have the same semantics. In this respect SUMO is somewhat like any set of mathematical expressions or statements in a programming language where the semantics is drawn from the code or mathematics and not human linguistic intuitions. A variable or term can be called “income”, or “x” or “sym4643” and still have the same semantics in a formally specified mathematical system.

SUMO proper has a significant set of manually created language display templates that allow terms and definitions to be paraphrased in various natural languages. These include
3. Ontology Development

The number of concepts employed by human beings in thought and discourse are near
infinite. Every new project with SUMO entails development of at least some new ontological
content, and this present work is no exception. In reviewing the court transcripts, we came up
with a number of informal concept types that were associated with clarification acts. The first
conceptual division is between Questioning and Stating, which were already defined in SUMO.
New concepts included Apologizing, Confirming, Elaborating, Restating, Correcting and
Prompting. Prompting was however not actually used in the markup. Other concepts already
present in SUMO were Answering, Disagreeing and ExpressingDisapproval.

A full definition of each term can be found on-line at ontologyportal.org. Here we will
just provide one example of the content developed to define the notion of Apologizing. A first
step in definition is to define it as a specialization of an existing class, in this case, Stating. A
Stating in SUMO is an act that commits the speaker to some truth, and is in turn a specialization
of a LinguisticCommunication act. In an Apologizing the speaker states that some action he or
she took previously was wrong in some way; that it caused harm to the hearer. This is stated
formally in the axiom shown in Figure 1. While a full explanation of the logical language used
is beyond the scope here, this can be briefly explained as stating that if we have an instance of
an Apologizing action with a given agent and a given target or destination that there exists some
other action that the agent performed that the target of the Apologizing didn’t want. Or, to say
this more simply, we apologize to someone else about something we did that the hearer didn't
like.

Another step in formalization was to add some
additional ontological infrastructure for the
notion of benefitting or suffering in a particular
process or activity. SUMO already contained the
relation of “benefits”. We added the relation of
“suffers”. Mathematical statements added to
define these terms include that one wants to
benefit and does not want to suffer, and that if
one suffers in a given event that one does not
benefit from it and conversely that if one benefits
that one does not suffer. Note that these
definitions do not and need not conform to
informal linguistic notions of benefitting that
include actions that are not “atomic” and where
one might both benefit and suffer as a result.
The advantage of a formal ontology is that it
specifies precisely concerns such as this, so that there is no argument about linguistic intuitions,
and to resolve issues about meaning one can simply refer to a set of precise logical axioms.
Additionally, given this set of logical axioms, that can be (and are, periodically) tested for
logical consistency with automated theorem provers such as the E theorem prover (Schulz,
2002). In contrast, a set of English definitions would have to be examined by a human and
tested only via linguistic intuition. As the set of definitions becomes larger, it becomes
infeasible (or very unlikely) to have confidence that all definitions are consistent. We can use
the power of mathematical computation to help us maintain precision and consistency of
definitions (Pease et al, 2010).

\[
\begin{align*}
&=> \\
&(\text{and} \\
&(\text{instance} \ ?A \ \text{Apologizing}) \\
&(\text{agent} \ ?A \ ?AG) \\
&(\text{destination} \ ?A \ ?P)) \\
&(\exists \ \text{ACT}) \\
&(\text{and} \\
&(\text{suffers} \ ?ACT \ ?P) \\
&(\text{agent} \ ?ACT \ ?AG) \\
&(\text{holdsDuring} \\
&(\text{WhenFn} \ ?A) \\
&(\text{not} \\
&(\text{wants} \ ?AG \ ?ACT)))
\end{align*}
\]

Figure 1: One axiom that is part of the
definition of Apologizing
4. Method of Study

In this work, each speech act, which we define in terms of SUMO, is not simply a linguistically motivated label, but rather a mathematical definition that can be strictly compared to the specifics of an individual act. Definitions made this way are more objective and can be reused with SUMO being open-source and language independent, and supporting objective statistics about the number and kind of clarification dialogues.

Our work is a follow-up study on previous examinations of court interpreting transcripts in Hong Kong by (Cheung, 2012) and (Leung & Gibbons, 2008). We use bilingual verbatim transcripts from the first case out of five separate rape trials from the same online corpus “From legislation to translation, from translation to interpretation: The Narrative of Sexual Offences” (http://cpdb-arts.hkbu.edu.hk). It contains approximately 13,000 turns of dialogue. Following (Cheung, 2012), ‘turn is the unit of analysis and the “taxonomy of change of perspective of person” ‘ (Bot, 2005). The corpus is semi-structured in spreadsheet format, containing the attributes Turn number, Speaker and Utterance. The corpus is an open and free empirical data source that has been developed, tested and supervised by a team of academics in order to meet the needs of different research frameworks.

We have added the following clarification columns to the spreadsheet: Target of clarification (A mirror image of the speakers), Speech Act of clarification, Correspondent backward turn of the clarification, Correspondent forward turn of the clarification, and Findings.

<table>
<thead>
<tr>
<th>Turn</th>
<th>Speaker</th>
<th>Utterance</th>
<th>Target</th>
<th>Cause</th>
<th>Language</th>
<th>Speech act</th>
<th>Backward Turn</th>
<th>Forward Turn</th>
</tr>
</thead>
<tbody>
<tr>
<td>165</td>
<td>WC</td>
<td>而第三次嘅就係(.)好多種類有三(.)咗最少有四種(.)要食(.)幾次係</td>
<td>IET</td>
<td>i</td>
<td>eng</td>
<td>q</td>
<td>166</td>
<td>169</td>
</tr>
<tr>
<td>166</td>
<td>IET</td>
<td>there were at least (. ) four types of medicine on the third occasion and several intakes were required</td>
<td>JE</td>
<td>a-re</td>
<td>168</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>167</td>
<td>BPE</td>
<td>Di-did you actually take them? =</td>
<td>IE</td>
<td>i</td>
<td>eng</td>
<td>q-re</td>
<td>169</td>
<td>171</td>
</tr>
<tr>
<td>168</td>
<td>JE</td>
<td>=when you say intake doses you mean</td>
<td>IE</td>
<td>a-ap</td>
<td>170</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>169</td>
<td>IE</td>
<td>=doses=</td>
<td>JE</td>
<td>a-re</td>
<td>168</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>170</td>
<td>JE</td>
<td>=doses</td>
<td>IE</td>
<td>i</td>
<td>eng</td>
<td>q-re</td>
<td>169</td>
<td>171</td>
</tr>
</tbody>
</table>

Table 1: A sample of the corpus markup in tabular form

Let's explain the columns by taking just one row as an example from Table 1. In line 168, this is the 168th “turn” or alternation of speaker. “JE” is the judge, who is the speaker of the Utterance. The target of the utterance is the interpreter “IET” which means the person who is interpreting “I” into English “E” and that he or she is translating “T” rather than stating something as an individual, not in translation from someone else's utterance. The cause of the clarification “Cause” is interpretation. The language the judge is using is English “eng”. The speech act is a Questioning “q” (which is defined mathematically in SUMO). The Questioning refers to another utterance which is the “Backward Turn” of turn 166 (also shown in Table 1). There is also a “Forward Turn” or response to the utterance, which is turn 169 in which the interpreter attempts to clarify (albeit a bit pre-emptively) in English.
In the bilingual transcript for Case One there are 160 clarification acts, out of which 139 are clarification requests with at least one matching answering act. The 2 missing clarifications in this corpus is thought to be due to the occurrence of tacit assent from body language but this cannot be verified from the transcript.

Questioning can often be seen as a challenge to face and therefore is less frequent when addressed from low power to high power individuals (Tracya, 2002). As such, only clarification requests in the form of questioning are further analyzed as they represent a symbol of power. Although non-self correction can also be a symbol of power we will not look at it here. Of all the 139 clarification requests, 3 are duplicated in translation by the interpreter. The interpreter posed the highest number of questioning acts, which confirms his power over language, followed by the judge, who has the highest institutional power in the courtroom. Contrary to what one would expect, the witness and defendant who are situated at the bottom of this power chain asked for the least clarification, they actually requested more clarification than those by the barristers. This can be explained by the fact that other forces may also affect defendants and witnesses’ decision to clarify. One possible reason that defendants, in order to protect themselves, might speculate that they are vulnerable, and so end up being extra careful in word choice and clarification, because the stakes are high.

Among the 60 clarification requests sought by the interpreter, 3 were duplicated questioning from participants. This shows that the interpreter performs dual roles, where he is a conduit of communication when he is repeating an utterance request, as well as being the language expert. When he is seeking clarification on his own right, he is the language expert thus has the power of language. The majority of his clarifications are made in Cantonese. The reasons for this can be manifold. They could be due to the inherent ambiguity of Cantonese due to the absence of distinction between the male and female third personal pronouns, English being the record of language in the courtroom, his intention to maintain the Judge and barrister’s positive face or minimize his own negative face. As a result, we cannot justify our hypothesis based only on the number of clarifications counted in Cantonese by the interpreter. A second level of analysis is needed to delve into the actual utterances in order to calculate the number of whether this type of clarification is due to the issue of third personal singular pronoun.

The interpreter, as much as being the initiator of clarifications, is also the most popular target of clarification requests, followed by the witness and defendants. The reason for this is that the interpreter enjoys power over language. The high number of clarification requests directed towards the interpreter is accounted for by his dual role as the conduit of communication where he translated 46 of the clarification requests in English to the witness or the defendant. Despite this, he still bears the bulk of the clarification requests. This could be a phenomenon of a bilingual courtroom, where other interlocutors also speak Cantonese, thus resulting in a higher number of clarification requests to the interpreter. Under a normal situation, if the interpreter is competent, he should not be asked to clarify lexicographic and syntactic terms. However, a second level of analysis is needed to confirm this. The judge, being the most powerful person in the courtroom, received no clarification request at all. Both directions of the clarification request justify our general hypothesis, that the person with the highest power poses the most frequent clarifications yet receives the fewest clarification requests. Note that we are cognizant about direct and indirect speech acts, including the form and function of an utterance. We are not distracted by surface linguistic issues of whether a question act or a request act can be in the form of an interrogative, a declarative, or an imperative but rather markup the text and count the questioning forms on the basis of their actual semantic and discursive import.

5. Conclusion and Recommendations

In this paper we have discussed a simple markup method using ontology to analyze clarification speech acts, on a corpus of court transcripts, to verify the distribution of power relationships in a bilingual courtroom. The result has shown that the number of clarifications is directly correlated to the power of the person who posed clarification and inversely correlated to
the person with least power. However, this analysis cannot explain one of our hypotheses that more clarification requests are made in Cantonese due to the lack of distinction between male and female third personal pronoun. Although Cantonese appears to be the dominant language of clarification requests posed by the interpreter, issues of the power relationships cannot be isolated from the language variable. As this transcript is a record of court proceeding done in 1997, it is not feasible to interview the interpreter why certain clarifications were made at that time. It is proposed that in the future research of this kind to be done with both transcripts and access to the interpreter to confirm this.

References
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