Emotions in language: Linguistic and computational approaches

Tutorial at LREC 2016

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Summary

The emotions – or related concepts, and the words used to describe them – have been the subject of discussion for millennia. Philosophers have pondered whether they are good or bad, rational or irrational, spontaneous or controllable by free will. More recently, psychologists and others have argued as to whether they are the observable bodily reactions to some stimulus, or whether they are a complex mixture of physical, cognitive and cultural factors.

Although computers can collect and process vast amounts of data faster than the human brain, it is clear that they find it difficult to interpret even the simpler emotional reactions in human beings. One obstacle is the inability of this "artificial intelligence" to read the subtle physical clues to emotional states that most humans understand intuitively; the other was the difficulty in understanding more than the most objective statements and questions expressed in language, both spoken and written.

This tutorial will examine why the processing of natural languages encounters problems in studying any type of subjective language. The study of the semantics of the lexicon, syntax, or metaphors of emotion in all types of language, and the effect of intonation, non-verbal communication and discourse strategies in spoken language, still demand knowledge of real world cultural conventions. The search for subjective language can be helped by, but not restricted to lexical items. The tutorial will also show that, even if emotion is arguably a universal phenomenon, multilingual and multicultural studies suggest a degree of relativity that must be addressed if computational tools and techniques for one language are to be "translated" to another.

Programme 9.00 – 10.30

Introduction

The tutorial will start with a brief introduction to the interdisciplinary nature of the study of emotions, and point out that what is generically referred to as 'emotion' or 'sentiment' in English varies according to different theories. There will be no attempt to make definitions but we shall simply try to show why there is so much debate about what these words/concepts mean, not to mention the analyses made of other words used in this general area. We should like to point out that the cognate versions of these do not always refer to the same concept in different languages/cultures, but we will use English since the tutorial is in English.

Background Bibliography

White et al. (2008) is a collection of articles from a wide spectrum of interest in emotion. For the purpose of this tutorial, Part 1 - Interdisciplinary Foundations contains articles of considerable background interest and some of them will be recommended more specifically during the tutorial. There are also articles in Part 2 - Biological and Neurophysiological Approaches that will be of interest to those studying both verbal and non-verbal human-computer interaction. Some of the articles in Part 4 - Social Perspectives, Part 6 - Cognitive Factors, and Part 8 – Select Emotions also offer insights that can be valuable when trying to understand how the human conceptualization and understanding of the emotions are expressed in language and developed culturally and socially.

1. **Contributions to emotion studies from philosophy, psychology, culture and linguistics**
   a. **Universality v. relativity of emotions:**
   b. **Cultural, geographical and historical aspects**

This section will begin by asking how far emotions can be considered universal phenomena. It will then go on to examine ways in which the interpretation of these phenomena varies over time and in different cultures and languages.

Over the centuries what we now call emotions have demanded the attention of philosophers who have both influenced and reflected our beliefs and ideals.   At a different level, the present day study of the 'history of the emotions', or how emotions have been identified by society and acted upon down the centuries in different cultures, shows that the concepts / words we believe to be so

universal are by no means as fixed as we might naively believe. The attitudes vary across cultures that, in turn, express these differences through their languages and behaviour.

Although English dominates the academic world – and particularly the NLP world – no one can presume that theories and technologies prepared for modern English, and a supposedly globalized world, will necessarily be applicable across other languages and in specific cultures or contexts.

2. **Conceptual models of the emotions from:**
   a. **Psychology: Arnold, Davitz, Ekman, Cornelius, Plutchik and others;**
   b. **Linguistics: Ortony, Clore & Collins, Wierzbicka and others.**

This section will synthesize the main approaches to the conceptualization and categorization of the emotions since Darwin's 1872 book *The Expression of Emotion in Man and Animals*. Cornelius (2000) describes four main theoretical approaches: the Darwinian approach that interprets emotions as an evolutionary development in man and the animals to account for the apparently automatic responses to emotion-causing situations; the Jamesian approach that takes this further and consider the essence of emotion to be its physical manifestation, which is then processed cognitively a posteriori; the Cognitive approach, led by Arnold (1960) argues that cognitive appraisal must precede the emotional response; and the Social-Constructivist approach which considers how emotions are constructed or filtered through the social and cultural traditions of the subject.

There are, of course, others who will propose a different set of approaches or divide them differently, but the important point for us here is the fact that, in order to discuss these problems, we must turn to language to do so. The various lists of 'emotions' that have been produced show a fair amount of disagreement that can be traced to the different approaches described by Cornelius. The translation of these lists into another language will show that, even when there appear to be direct translations, the actual cultural interpretation of the translated versions differs. This has led linguists to attempt ways of avoiding actual lexical items and, instead, identify what they mean in terms of schema or scenarios, or by proposing a cognitive structure of non-lexicalized meaning.

To understand how this has been attempted, White (2004) explains how emotions are described in terms of categories, metaphors, schema and discourse. The tutorial will use the attempts by Wierzbicka (several publications) to define a universal/common semantic metalanguage with which to define (in this case) emotions, and Ortony, Clore and Collins (1988) to propose a cognitive structure of the emotions independent of language.

Coffee break – 10.30 – 11.00

Programme - 11.00 – 13.00

3. **The connection between emotion and cognition:**
   a. **Psychological and neurological evidence;**
   b. **Evidence in language.**

One philosophical problem that has been discussed over the last two thousand years is the relationship of 'emotion', usually, but not always, considered 'bad', to 'reason' or 'cognition', usually seen as 'good'. However, the main difficulty appears to be actually distinguishing between emotion and cognition.

Today the research that was behind Damásio's (1994) explanation of the role of emotion in intelligence, and Goleman's (1996) and (2007) popularization of the notions of emotional and social intelligence, has demonstrated that emotion is not opposed to reason, but is an essential part of human intelligence. More practically, language related phenomena such as various types of dyslexia, aphasia and autism are now attributed to neurological factors, rather being blamed on parental or educational failings.

Interestingly, the connection between emotion and 'reason' is embedded in everyday language. Despite the differences between languages that have already been referred to, and which will be developed in the next section, it is possible to discern certain tendencies in the use of the emotion lexicon and syntax that are common to many languages.

Philosophers like Kenny (1963) drew attention to the semantics of the syntax of emotion verbs to argue that the way the verbs that refer to emotion tend to reject use in the imperative, the passive, and the progressive aspect in English, suggests that emotions are not subject to free will. Psychologists like Davitz (1969) looked for descriptions of physical sensations, often with reference to expressions using words that (out of context) have denotative meanings unassociated with emotion. Linguists like Lakoff & Johnson (1980) and Kövecses (2000) argued in favour of examining the everyday metaphors in conversation that indicate emotion. Maia (1994) found that the actual usage of the lexicon of emotion, when analyzed at a lexical + syntactic + discourse level using evidence from corpora, demonstrated that there is a strong connection in our everyday understanding of the

relationship of emotion and cognition. Even a cursory glance at a general corpus will show that emotion words often occur in situations that imply cognitive processes -- or they may even occur in simply formulaic expressions indicating politeness (Maia & Santos, 2012).

4. **Expression of emotion across languages and cultures: Evidence from different languages, especially through translation.**

The apparent universality of emotion is no more than that attributable to many other aspects of human experience. As the various experiments with such an apparently universal aspect of our lives as colour show, the terms and their importance in different languages vary considerably. No one would dispute the different vocabularies, and related realities, of different languages and cultures for such necessities as food, clothing and lodging, let alone aspects of life that differ for geographical reasons. It is therefore hardly surprising that such a highly subjective area as the emotions or sentiments, and their expression and interpretation, should vary not just from language to language, from culture to culture, but also from individual to individual.

Context plays an important role in the communication of our emotions and sentiments, and the meaning of words mutates to suit different purposes. Key emotion words such as *love, hate,* and *fear* are often found in formulaic expressions of politeness with little emotional content (e.g. _I am afraid_ *I shall be 5 minutes late)*; descriptions of physical reactions may use metaphors with words that have an unassociated denotative meaning (e.g. *Tensions in the country had reached boiling point)*; and, although we often find expressions we believe will lead us to subjective language, the fact is that proverbs, set phrases and clichés often suffer from imaginative rewording in actual usage. From this it should be clear that any form of subjective language presents a real challenge to natural language processing.

The complications that arise when translating between languages are therefore inevitable. The lexicon may appear similar across languages, but its possible uses will depend on various cultural factors. For example, several languages have an equivalent for the English *love* but, in practice, reserve it for very restricted occasions. Traditions of politeness and the formulaic expressions associated with it vary considerably from culture to culture. The acceptability of the manifestation or expression of emotions or opinions varies between certain social groups, even within the same general culture. Translators and interpreters must therefore be aware of these factors, particularly if they are operating in culturally sensitive situations, such as public services interpreting, marketing, or

literature with extensive ethnic content.

5. Computational resources for studying emotion in human communication: Written and spoken monolingual and multilingual language corpora;

Corpora come in many forms. Some of the publicly available corpora may not be suitable for sentiment analysis. Large general corpora that include a wide variety of written and transcribed language will always allow an overall view of language usage and the formulation of basic hypotheses, but they have their limitations. Although it is essential to develop a solid methodology based on basic hypotheses, it is clear that most financed projects nowadays concentrate on sentiment analysis that detects sentiments or opinions in more ephemeral texts, such as online news, blogs, and social media such as Twitter or Facebook. However, in order to create methodologies for texts from social media, we need to take into account more than just the actual words; and emoticons, images and other factors create new challenges.

Given the ubiquity of emotion in human action (and talk), there are many words and linguistic constructions associated with emotion, making the construction of lexicons and annotated corpora a daunting task, no matter which approach is taken. The difficulties inherent to the process of constructing a suitable corpus, and attempts to automatically obtain a set of texts or words for research purposes, all provide a better understanding of the subject. However, once constructed or extracted, these resources are invaluable for developing new applications and for analysing and obtaining a better insight into the language (and meaning) of emotion. We will briefly describe methods to create and use these resources.

We will discuss manually compiled lexicons such as the General Inquirer (Emotions, or Evaluative adjectives), computationally enriched (manually compiled) ontologies such as Valitutti et al. (2004) or Pasqualotti & Vieira (2008), lexicons computed from corpora (Riloff et al. 2003, Xu et al. 2010, Pitel & Greffenstette, 2008), or obtained through other kinds of methods (Silva et al. 2012, Staiano & Guierini 2014). We will present annotated corpora with emotions and/or opinions while discussing some linguistic problems for identifying, and classifying, emotion in text, from Bruce & Wiebe (1999), Pang & Lee (2008), Volkova et al. (2010) and others.

Finally, we discuss some applications and findings based on these resources.

6. Verbal and non-verbal expression of emotion in multimedia.

This is an enormous area that it will not be possible to discuss in detail here, but we hope to indicate some of the problems involved. The verbal expression of language includes aspects such as pronunciation or intonation of speech to indicate emotional involvement, but also sounds like sighs, snorts, gasps and crying. Non-verbal communication through facial expression, gestures and body language also contribute considerably to the way we interpret emotional meaning. These phenomena are understood easily by most human beings, and even many animals, but there is a gradient from highly sensitive people, through those that find it more difficult to understand such signals, to those who suffer from certain varieties of autism. Artificial intelligence may be largely at the extremely autistic side of the spectrum, but that does not stop a lot of people trying to improve it, or at least help it to appear to understand its human users.

Speech production from text has improved to almost human levels, as anyone who has listened to the programmes that automatically read text or the Internet to the blind will have noticed. However, it is still limited to interpreting more regular written language rather than spontaneous emotional communication. Speech recognition may help human researchers to distinguish between individuals, as happens in forensic analysis of voices, but at the level of computer<>human communication, it still struggles with different voices and their regional and social dialects. Analysis of facial expression to detect lies and faked emotions seems to be producing some results and, apart from its forensic use, may help to discover why some actors are better than others, or why some singers create a more positive emotional response to their work than that of others.

Multimedia, however, needs to associate verbal language to facial expression, gestures and body language. This is not a problem for monolinguals who are neither deaf nor blind, but it has interesting implications for providing assistance for those with these handicaps, as well as those who provide sub-titling and dubbing into different languages for films and television, not to mention the localization of video games. Can translators rely on 'universal' body language and facial expression to convey the message while they translate the words to fit into the space provided, or must they adapt the message to the culture? Can the faces in the images be manipulated when dubbing to look as if the speakers are using the second language? Computer-animated films like the 2011 *Adventures of Tintin* try to adapt the images to different languages, but to what extent can, or should, the cultural reality of the emotions in the original be adapted to fit that of the target version? Video games have

their own supposedly international appeal, but might they sell even better if adapted or localized appropriately to different cultures? To answer these questions we need more from computational linguistics than a knowledge of phonetics, acoustics and phonology as described in Jurafsky & Martin (2009).

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