



A quantitative approach to conceptual, procedural and pragmatic meaning: Evidence from inter-annotator agreement

Cristina Grisot^{a,b,1,2,*}

^a University of Geneva, Department of Linguistics, Switzerland

^b University of Neuchâtel, Cognitive Science Centre, Switzerland

Received 19 November 2016; received in revised form 28 June 2017; accepted 30 June 2017

Available online 26 July 2017

Abstract

This study deals with three key notions in the relevance-theoretic framework: *conceptual* and *procedural* linguistically encoded meaning on the one hand, and *pragmatic* meaning on the other hand. I argue that having objective and quantitative measures for distinguishing among these types of meaning is necessary. Concretely, a quantitative measure is proposed based on offline annotation experiments made by untrained native speakers. This is *inter-annotator agreement* measured with chance-corrected agreement coefficients, such as Cohen's *kappa* coefficient. In order to reliably use the three layered scale for interpreting the values of the *kappa* coefficient, a series of requirements regarding the building and the running of the experiment, as well as the analysis of results, must be adhered to. In this paper, the measure is applied to verbal tenses in order to identify and investigate their contextual usages. It is shown that when speakers are asked to consciously evaluate the contribution of verbal tenses to the interpretative process, three patterns emerge systematically. The first is the easiness of the task and the high rate of inter-annotator agreement when they deal with the distinction past/non-past. The second is a greater difficulty of the task and lower rates when they deal with temporal ordering eventualities. The third is the impossibility to have inter-annotator agreement beyond chance level when they have to consciously identify a subjective or non-subjective point of perspective. It is argued that this observed difference may be explained in terms of the different contents that the addressee deals with: conceptual, procedural, and respectively, purely pragmatic.

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Keywords: Conceptual meaning; Procedural meaning; Pragmatic meaning; Empirical pragmatics; Inter-annotator agreement rates; Relevance theory

1. Introduction

For the last twenty years, we have experienced the rise of empirical and experimental linguistics and pragmatics, fields in which theoretical models are required to be tested and validated. Theory and testing are two essential components of reproducible science: while theoretical models increase in accuracy when they are tested, experimental testing of

* Correspondence to: University of Geneva, Department of Linguistics, Switzerland.

E-mail address: cristina.grisot@unige.ch.

¹ <https://www.unige.ch/lettres/linguistique/collaborateurs/postdocs/cristina-grisot/>.

² I am very grateful to Jacques Moeschler, Paola Merlo, Sandrine Zufferey, Hannah Rohde and Richard Zimmermann for their valuable and inspiring comments on earlier versions of this paper. I would like to thank the anonymous reviewers for their relevant comments and suggestions, which allowed me to render the proposal made in this article more accurate and precise. This research was financed by the which is financed by the Swiss National Science Foundation. The funding was obtained for the COMTIS (no. 127510 www.idiap.ch/project/comtis/), MODERN (no. 147653 www.idiap.ch/project/modern/), and VTS research projects (*Verbal tenses and subjectivity: an empirical cognitive approach*, no. 100015_170008/1).

hypotheses and interpretation of results, including *p*-values and statistical coefficients, are meaningful only when they are theoretically informed. Experimental methods in linguistics were first used in the field of *experimental syntax*, which tests and develops syntactic models using psycholinguistic experimentation (Musolino, 2001; Musolino et al., 2010; Syrett et al., 2012). The field of *experimental pragmatics* (Noveck and Sperber, 2004) draws on pragmatics, psycholinguistics, psychology of reasoning, and neurolinguistics (cf. Bertuccelli Papi's 2010 discussion about how pragmatics fits with the brain). Other linguists turned towards *empirical* and *probabilistic pragmatics*, which draws on corpus linguistics, offline experiments with acceptability or linguistic judgement tasks, and web-based methods (Romero-Trillo, 2014 for the former; Degen, 2015 for the latter), and computational linguistics (Cartoni et al., 2013a,b; Zufferey and Cartoni, 2014; Zufferey and Popescu-Belis, 2017; Grisot et al., 2016).

One pragmatic topic that has resisted the experimental/empirical rise in pragmatics (with a few recent exceptions, such as Bolly and Degand, 2013; Zufferey, 2014; Grisot and Moeschler, 2014; Grisot, 2015; Bolly et al., 2015) is the relevance-theoretic *conceptual/procedural* distinction introduced by D. Blakemore (1987, 2002) to explain differences between words with a conceptual content, such as *table*, *cat*, *think* or *walk* on the one hand, and discourse connectives, such as *but*, *so* or *also* on the other hand. Blakemore's argument was that content words encode concepts that contribute to the proposition expressed by an utterance while the meaning of a discourse connective is better described in terms of constraints on the inferential phase of interpretation rather than in conceptual terms. Currently, our challenge is to identify the features of conceptual and procedural information and to experimentally and empirically find the traces which allow us to measure the unseen process they point to (i.e. building and manipulation of mental representations). The issue at stake in this article is twofold. Firstly, I argue that the existing work does not specify how we can know what kind of meaning (conceptually encoded, procedurally encoded or pragmatically inferred) is at play beyond researcher intuition. Secondly, I show how evidence from inter-annotator agreement is used to apprehend the underlying processes conceptual, procedural and purely pragmatic information point to and to draw a distinction among them.

In theoretical pragmatic studies, the application of the existent qualitative criteria depends on the linguists' own judgements based on their intuition, with which other linguists might not agree. Research based on theoretical models that are not tested and validated empirically and experimentally is judged according to whether or not the reader found the explanation plausible. Consequently, linguistic expressions are understood and analysed differently from one study to another. One example is that of the connective *but*, which is analysed by Blakemore (1987, 2000, 2002) and Iten (2000) as encoding an instruction to process the clause that follows as contradicting and eliminating an assumption, by Bach (1999) as contributing to the truth-conditions of a proposition and therefore not encoding procedural information, and by Hall (2004) as encoding an instruction to suspend an inference that would result in a contradiction with what follows.

Additionally, the researchers' subjective judgments are generally given for artificial examples built to serve their own purposes, rather than by non-trained (also called *naïve*) speakers on natural or on experimentally controlled data. In order to increase the reliability of studies targeting the conceptual/procedural distinction, we need to make use of real corpora and empirical methods, such as annotation experiments in which non-trained speakers annotate linguistic data according to a given set of annotation guidelines. This leaves us with the need for an objective and quantitative measure for evaluating the results of this type of experiment. I suggest to use *inter-annotator agreement* measured with chance-corrected agreement coefficients, such as Cohen's *kappa* coefficient (Carletta, 1996; Artstein and Poesio, 2008; Spooren and Degand, 2010) as an objective method for investigating the type of information judged: conceptual, procedural, or purely pragmatic recovered through non-demonstrative inferences (i.e. inferences which do not guarantee the truth of the conclusion from the truth of the two premises, as opposed to demonstrative inferences) (Sperber and Wilson, 1986, 1987). It is a tool permitting researchers to evaluate the results of experiments in which speakers are asked to judge linguistic expressions regarding their encoded or pragmatically determined meaning. The interpretation scale of this coefficient is directly dependent on the theoretical assumptions that underpin the experimental investigation, and it makes reference to the behaviour of conceptual and procedural types of information predicted by Wilson and Sperber's cognitive criteria (1993/2012).

This paper is organised as follows. In section 2, I review the qualitative criteria currently used by scholars for distinguishing between conceptual and procedural information, and I show that, while some of them are discriminatory criteria, others are too intuitive. Section 3 is dedicated to the proposal made in this paper, namely to use inter-annotator agreement for identifying the type of content dealt with in annotation experiments: conceptual, procedural, or pragmatic. The proposal is illustrated with a series of experiments targeting verbal tenses. Section 4 concludes this paper.

2. Current assessments of the conceptual/procedural distinction

In this paper, the conceptual/procedural distinction refers to types of encoded meaning, which make different contributions to the interpretative process. Conceptual meaning refers to concepts encoded by some linguistic expressions, that is, the concept for which that linguistic expression is the lexical entry. Procedural meaning points to encoded instructions about how to manipulate conceptual representations. Both the concept and the linguistic expression

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