

Understanding Meaning and Knowledge Representation

Understanding Meaning and Knowledge Representation:

*From Theoretical and
Cognitive Linguistics to Natural
Language Processing*

Edited by

Carlos Periñán-Pascual
and Eva M. Mestre-Mestre

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INTRODUCTION

The purpose of the book is to examine and discuss recent work in meaning and knowledge representation within theoretical linguistics and cognitive linguistics, particularly that research which can be reused to model natural language processing (NLP) applications. Today there is a need to develop NLP systems from a linguistically aware approach. Although there are many NLP applications that can work without taking into account any linguistic theory, this type of systems can only be described as “deceptively intelligent”. On the other hand, those computer programs requiring some language comprehension capability should be grounded in a robust linguistic model if we want them to display the expected behaviour. Therefore, this book is concerned with the in-depth study not only of the multiple dimensions of language, e.g. morphology, syntax, semantics, pragmatics, concept formation, lexicon, and many others, but also of the interfaces between the components of the architecture of the language system and the processes underlying language comprehension and production under varying circumstances and situations. The new insights from this type of research can undoubtedly help model more robust NLP systems. This book is divided into three thematic parts.

From functionalist and/or cognitivist approaches, PART 1 deals with various theoretical linguistic issues that have the potential to enhance NLP systems. For example, Role and Reference Grammar (Van Valin 2005) plays an important role in the first three chapters of the book. In chapter one, Brian Nolan explores the causal relations underpinning the concepts of transfer, let/allow and permission and their argument realization in Modern Irish (Nolan 2012, 2013). In this regard, he examines a number of syntactic construction patterns associated with the argument realization, considering factors such as control and volition (Dixon 2010) in causal event chaining. In chapter two, Elke Diedrichsen describes the *lassen* (‘let’) construction in German, whose semantics can vary within a spectrum of meanings involving direct causation, permission and non-intervention. The syntax and semantics of the construction are discussed extensively, being represented in a Constructional Schema that displays its features. In chapter three, Aoife Finn studies if the meaning of transitive verbs in Māori is actually the same as that of neuter verbs, as proposed in

traditional grammars (Harlow 2007). It seems that, although neuter verbs and transitive verbs have similar meanings, the syntactic realization of these two types of verbs is quite different. Given their different syntactic realizations, this chapter preliminarily considers the logical structure of neuter verbs via Aktionsart tests. Thus, the findings in chapters one, two and three may be very valuable, for example, for machine translation in general and for word sense disambiguation in particular. On the other hand, and from the cognitive realm, the analysis of lexical polysemy has a special treatment in the next two chapters. In chapter four, Svetlana Kiseleva and Nelly Trofimova examine the mechanisms of meaning extension in the polysemous English verbs of part-whole relation. Their theory is based on the idea that the meaning of any word can be explained by means of an exact paraphrase composed of simpler, more intelligible lexical components than the original (Wierzbicka 1972). Thus, their main statement is that every complex word has a substantial core, being the essential basis that provides its semantic integrity. In chapter five, Aysun Balkan analyses the applicability of the Principled Polysemy model (Tyler and Evans 2003) to the Turkish *üst* construction ('on' and 'over') including spatial nouns suffixed with dative case marker. Despite the fact that Turkish and English are typologically distinct languages and express spatial relations using very different linguistic elements, the current study shows a surprising amount of overlap with the primary and extended senses found in the polysemy networks of 'üst + Dative' and English 'over'. Again, a treatment of polysemy such as the ones proposed in these two chapters can help machines solve lexical ambiguity. Likewise, chapter six can be very relevant for anaphora resolution, where Alana Poncarová presents various methods of reconstructing the meaning of co-referential chains in Czech from the perspective of Centering Theory (Brennan, Friedman and Pollard 1987; Grosz, Joshi and Weinstein 1995). Her research shows that the information structure (Topic-Focus articulation) and the constituent structure (Subject-Object function) are key factors in this process. Moreover, in chapter seven, Ciro Antunes de Medeiros describes the human ability to produce superordinate categories in the context of the relationship between conceptual organization and lexical acquisition, a cognitive modelling topic which can be of interest to researchers in ontology development. Finally, in chapter eight, Elena Even-Simkin describes an iconic phono-morphological analysis of the internal-vowel-alternation phenomenon in plural nouns and past tense forms in English based on the theory of Phonology as Human Behavior (Diver 1979; Tobin 2009). The findings presented in this chapter may have

implications in the field of Web search engines or in human-robot interaction.

PART 2 consists of two chapters that intend to demonstrate the reader about the need for NLP research groups to have linguists collaborating with computer engineers. To a layman, this could be a non-issue, since at first sight computational linguistics is deemed as a sub-discipline of applied linguistics. However, theoretical linguistics has usually played a remarkably minor role in this field of research. Indeed, Wilks (2005) noted that the links between NLP and linguistics have not been either so numerous or so productive as we could imagine. Based on the authors' vast experience in this field, chapters nine and ten portray this situation from a contemporary view. In chapter nine, Brian Nolan examines the question 'What can theoretical linguistics do for NLP research?' from a number of perspectives, including linguistics, informatics and engineering. He explores the work practices and goals of contemporary linguists today and the tools they use in that work. This chapter also describes the contribution of linguistic theory (generative, constructional and functional) to linguistic realism to achieve descriptive, explanatory and computational adequacy while managing issues with linguistic and computational complexity. The functionality of many future NLP applications is not yet known; however, language-aware human cognitive technologies can point us in a very interesting direction. He concludes that the future is bright for linguists, especially those with some software skills, and that linguistic theory has a significant contribution to make to NLP. On the other hand, in chapter ten, Elke Diedrichsen supports the idea that NLP can benefit from scholars and researchers who work in theoretical linguistics, in particular functional models of grammar. The breadth of language-aware products available today is indicative of the way the IT industry is growing globally. We live in a multilingual world, and all these languages need to be properly characterized for the benefit of the customers of these products. The way to achieve this is to take on board the knowledge and insights provided by theoretical linguistics. The potential for 'next generation' IT products, arising from synergistic efforts of linguists, computer scientists and engineers working together, is huge. This chapter discusses some of the new language-aware products and applications that have recently emerged from leading IT companies.

PART 3 serves to illustrate how a linguistically aware and cognitively plausible approach to human-like processing through FunGramKB Suite can contribute to the development of enhanced knowledge engineering and NLP projects. FunGramKB Suite (Periñán-Pascual 2012, 2013) is a user-friendly environment for the semi-automatic construction of FunGramKB,

a lexical-conceptual knowledge base particularly designed for natural language understanding systems, and for the development of tools for the automatic processing of language (cf. Perrián-Pascual and Arcas-Túnez 2014b). In this regard, in chapter eleven, Carlos Perrián-Pascual and Eva M. Mestre- Mestre accurately describe a hybrid approach to the evaluation of automatic term extraction systems, which have been traditionally evaluated by means of one of two methods, i.e. gold-standard reference lists or validation based on experts' judgements (Pazienza, Pennacchiotti and Zanzotto 2005). In particular, these authors explore the way that the IATE thesaurus together with a specialized dictionary can be semi-automatically integrated with the human validation of term candidates. The experiment was performed with DEXTER, an open-access platform for data mining and terminology management that can export specialized terms to FunGramKB. In chapter twelve, Ana Díaz Galán and María del Carmen Fumero Pérez contribute to ARTEMIS, a grammar development environment that outputs the parse tree of a text based on the Layered Structure of the Clause in Role and Reference Grammar. In particular, they study the grammatical phenomenon of the insertion of the DO operator in simple sentences in English. In chapter thirteen, María José Ruiz Frutos explains how the semantic knowledge, common-sense knowledge and world knowledge in FunGramKB can help solve co-reference ambiguity. In chapter fourteen, Ángela Alameda Hernández and Ángel Felices Lago explore the design and development of specialized-knowledge ontologies in the FunGramKB framework. In particular, they describe the methodological problems encountered in the conceptualization of the superordinate concept CRIME and its configuration as an umbrella concept. Finally, the aim of chapter fifteen is to set the basis for the creation of a terminological satellite ontology of mental disorders within FunGramKB. In this work, María Beatriz Pérez Cabello de Alba and Ismael Iván Teomiro García follow Felices-Lago and Ureña Gómez-Moreno's (2012) methodological underpinnings for the construction of terminological subontologies in FunGramKB, as well as Perrián-Pascual and Arcas-Túnez's (2014a) methodology used in the design of a subontology on criminal law in FunGramKB. The authors employ a tool based on Latent Semantic Analysis (Landauer, Foltz and Laham 1998) in order to complete the phases of corpus compilation and term extraction. As can be noted in this third part of the book, linguists play a major role in those NLP systems which exploit FunGramKB as its knowledge base.

This monograph was conceived from the different perspectives of a full gamut of research projects concerned with language understanding

through the prism of theoretical linguistics, cognitive linguistics and computational linguistics. Therefore, the book will be of particular interest to scholars, researchers and postgraduate students who work in these fields of knowledge.

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References

- Brennan, Susan, Marilyn Friedman and Carl Pollard. "A Centring Approach to Pronouns." In *Proceedings of the 25th Annual Meeting of the Association of Computational Linguistics*, 1987.
- Diver, William. "Phonology as Human Behavior." In *Psycholinguistic Research: Implications and Applications*, edited by D. Aaronson and R.W. Reiber, 161-186. Hillsdale: Lawrence Erlbaum, 1979.
- Dixon, Robert M. W. A typology of causatives: form, syntax and meaning. In *Changing Valency: Case Studies in Transitivity*, edited by R.M.W. Dixon and Alexandra Y. Aikhenvald, 30-83. Cambridge: Cambridge University Press, 2010.
- Felices-Lago, ngel and Pedro Urea G3mez-Moreno. "Fundamentos metodol3gicos de la creaci3n subontol3gica en FunGramKB." *Onomzein* 26 (2012): 49-67.
- Grosz, Barbara, Aravind Joshi and Scott Weinstein. "Centring - A Framework for Modeling the Local Coherence of Discourse." *Computational linguistics* 21 (1995): 203-225.
- Harlow, Ray. *Mori: A Linguistic Introduction*. Cambridge: Cambridge University Press, 2007.
- Landauer, Thomas K., Peter W. Foltz and Darrell Laham. "Introduction to Latent Semantic Analysis." *Discourse Processes* 25 (1998): 259-284.
- Nolan, Brian. *The Structure of Irish: A Functional Account*. Sheffield: Equinox Publishing, 2012.
- Nolan, Brian. "Constructions as Grammatical Objects: A Case Study of the Prepositional Ditransitive Constructions in Modern Irish." In *Linking Constructions into Functional Linguistics. The Role of Constructions in RRG Grammars*, edited by Brian Nolan and Elke Diedrichsen, 143-178. Amsterdam: John Benjamins, 2013.

- Pazienza, Maria Teresa, Marco Pennacchiotti and Fabio Massimo Zanzotto. "Terminology Extraction: An Analysis of Linguistic and Statistical Approaches." In *Studies in Fuzziness and Soft Computing: Knowledge Mining*, edited by Janusz Kacprzyk and Spiros Sirmakessis, 255-279. Berlin-Heidelberg: Springer, 2005.
- Periñán-Pascual, Carlos. "The Situated Common-Sense Knowledge in FunGramKB." *Review of Cognitive Linguistics* 10-1 (2012): 184-214.
- . "A Knowledge-Engineering Approach to the Cognitive Categorization of Lexical Meaning." *VIAL: Vigo International Journal of Applied Linguistics* 10 (2013): 85-104.
- Periñán-Pascual, Carlos and Francisco Arcas-Túnez. "La Ingeniería del Conocimiento en el Dominio Legal: La Construcción de una Ontología Satélite en FunGramKB." *Signos* 47-84 (2014a): 113-139.
- . "The Implementation of the FunGramKB CLS Constructor". In *Language Processing and Grammars: The Role of Functionally Oriented Computational Models*, edited by Brian Nolan and Carlos Periñán-Pascual, 165-196. Amsterdam/Philadelphia: John Benjamins, 2014b.
- Tobin, Yishai. "Phonology as Human Behavior: Applying Theory to the Clinic." *Asia-Pacific Journal of Speech, Language and Hearing* 12-2 (2009): 81-100.
- Tyler, Andrea and Vyvyan Evans. *The Semantics of English Prepositions: Spatial Scenes, Embodied Meaning and Cognition*. Cambridge: Cambridge University Press, 2003.
- Van Valin, Robert D. *Exploring the Syntax-Semantics Interface*. Cambridge: Cambridge University Press, 2005.
- Wierzbicka, Anna. *Semantic Primitives*. Frankfurt: Athenäum, 1972.
- Wilks, Yorick. "Computational Linguistics: History". In *Encyclopedia of Language and Linguistics*, second edition, 761-769. Oxford: Elsevier, 2005.

PART ONE:
MEANING AND KNOWLEDGE
REPRESENTATION

CHAPTER ONE

CAUSAL RELATA AND EVENT CHAINS IN THE CONCEPTS TRANSFER, LET/ALLOW AND PERMISSION IN MODERN IRISH

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1. Introduction

We know that the analysis of the causative (Nolan 2012a: 33; Nolan 2015; Nolan, Rawoens and Diedrichsen 2015) intersects with semantics, syntax and morphology and, as such, the causative construction remains one of the primary research areas for many linguists. It has been generally recognised that there are three prototypical types of lexical, morphological and syntactic causative within any consideration of a causative taxonomy. However, as well as these types, a further distinction is made along semantic lines of inquiry between direct causation and indirect causation. That is, languages are known to make a distinction between direct and indirect causation through some language specific means. For example, in order to express direct causation, a language may use a causative construction in which a higher degree of fusion is seen in the expression of cause and effect. Correspondingly, indirect causation will exhibit a lower degree of fusion of cause and effect within the expression.

Many scholars, including Van Valin (2005:42; *n*5) and Song (1996: chapter 1), realise that treating all causatives as having the same ‘CAUSE’ element is a gross oversimplification of the complexities involved. There is essentially a contrast among three basic types of causality, including (i) Direct (Coercive), (ii) Indirect (Non-coercive), and (iii) Permissive. Both direct and indirect causality are represented by ‘CAUSE’, and permissive causality can, for example, be represented by ‘LET’ or ‘ALLOW’ in logical structures. We are concerned in this chapter with causative constructions and the concepts of TRANSFER, LET/ALLOW and PERMISSION within Modern Irish, as shown in (1).

(1) x CAUSES/PERMITS/LETS/ALLOWS y to DO/MAKE/HAVE z-something

In this analysis, we will be mindful of the typology of causation in the work of Dixon (2010: 62), where he proposes the nine semantic parameters in (2), described in Table 1.1, to characterize a typology of causation.

(2) State/action, transitivity, control, volition, affectedness, directness, intention, naturalness and involvement

An important set of considerations is also found in the work of Talmy (2000), where he proposes that the physical-force model maps straightforwardly to the psychological realm, since these same predicates are used to characterise psychosocial as well as physical causal relations. This proposal develops a central theme of cognitive linguistics according to which abstract conceptual content is derived from representations of physical reality. Gärdenfors (2007) similarly extends the Talmy perspective to characterise verbal concepts as patterns of forces:

Even though our cognition may not be built precisely for Newtonian mechanics, it appears that our brains have evolved the capacity for extracting the forces that lie behind different kinds of movements and action... In accordance with this, I submit that *the fundamental cognitive representation of an action consists of the pattern of forces that generates it.*

(Gärdenfors, 2007: 254)

We argue that the appropriate way to understand dynamic events is to consider them as forces: inputs of energy. Such inputs of energy may, or may not, have an effect on the state of affairs; this inherent defeasibility provides the tools necessary to naturally accommodate the problems of the concepts of TRANSFER, LET/ALLOW and PERMISSION. This accommodates Talmy's (2000) insight that component forces are referred to in the meanings of agonist-antagonist lexical items such as *enable*, *prevent*, and so on. The causing event corresponds to a force that is applied to a situation where the resulting stative predicate does not hold such that this force yields a situation where the resulting stative predicate does, or may, hold.