

Cambridge University Press

978-0-521-43481-2 - Structures and Categories for the Representation of Meaning

Timothy C. Potts

Frontmatter

[More information](#)

Structures and categories for the representation of meaning develops a way of representing the meanings of linguistic expressions which is independent of any particular language, allowing the expressions to be manipulated in accordance with rules related to their meanings which could be implemented on a computer. This requires a new two-dimensional notation, different from that of modern logic. The book begins with a survey of the contributions of linguistics, logic and computer science to the problem of representation, linking each with a particular type of formal grammar. Taking Frege as his guide, the author then presents a system of graphs organized by scope relations in which linguistic constituents are sub-graphs whose configuration is determined by their categories. In developing this system, he extends the notion of scope and argues that anaphoric and relative pronouns are structural signs not linguistic constituents. Certain count nouns are made the basis of this system and a new account of proper names, relating to count nouns, is given.

Cambridge University Press

978-0-521-43481-2 - Structures and Categories for the Representation of Meaning

Timothy C. Potts

Frontmatter

[More information](#)

**Structures and categories for the
representation of meaning**

Cambridge University Press

978-0-521-43481-2 - Structures and Categories for the Representation of Meaning

Timothy C. Potts

Frontmatter

[More information](#)

to

Peter Thomas Geach

**whose lectures on the theory of syntax
at the University of Leeds in 1967
originally inspired this work**

Cambridge University Press

978-0-521-43481-2 - Structures and Categories for the Representation of Meaning

Timothy C. Potts

Frontmatter

[More information](#)

**Die stillschweigenden Abmachungen zum
Verständnis der Umgangssprache sind
enorm kompliziert.**

(Wittgenstein, 1921, 4.002)

**Quia quaesisti a me, quomodo oportet
incedere in thesauro scientiae
acquirendo, tale a me tibi super hoc
traditur consilium: ut per rivulos, et
non statim in mare, eligas introire;
quia per facilia ad difficilia oportet
devenire.**

(Aquinas, letter *De modo studendi*)

Cambridge University Press

978-0-521-43481-2 - Structures and Categories for the Representation of Meaning

Timothy C. Potts

Frontmatter

[More information](#)

Preface

This work addresses the *representation* problem – to use the jargon of computer scientists. To be sure, they speak of the representation of *knowledge*, but that is a misnomer, reflecting their intentions rather than the nature of the problem. What counts as knowledge must be true, yet any notation in which we can express what is true must equally allow us to express what is false. The problem, therefore, is how best to represent the *meanings* of linguistic expressions so that they may be manipulated in accordance with rules, such as rules of inference or of translation. One might call this the ‘semantic form’ of expressions, by analogy with ‘logical form’.

My interest is restricted to expressions of everyday language. This is not a synonym for ‘natural language’. The implied contrast is with technical language, for example the language of mathematics, which might also qualify as natural language. I also assume that, in the case of expressions which are accounted either true or false (propositions¹), the central core of their meanings will be given by specifying the circumstances under which they would be true, so that semantic form or structure will relate to and should facilitate these specifications.

Identifying the structure is, indeed, the very first step in such a specification, for the meaning of an expression is determined by the meanings of its parts and the manner of their combination; that much is implicit in the possibility of learning a language (see Davidson, 1965). Yet there seems to be a remarkable reluctance on the part of those concerned with the study of meaning to discuss structural issues. Time and time again one finds that an author is simply taking a certain structure for granted, in order to press on as quickly as possible to offer an account of the truth conditions of propositions containing the types of expression in

¹ This is the traditional sense of ‘proposition’, and the sense in which it will be used throughout this book. It should not be confused with a more recent sense, deriving from Russell, in which a proposition is an abstract entity constituting the meaning, or perhaps denotation, or perhaps reference of a proposition in my sense.

Cambridge University Press

978-0-521-43481-2 - Structures and Categories for the Representation of Meaning

Timothy C. Potts

Frontmatter

[More information](#)

xii Preface

which he or she is currently interested. Structures are, moreover, usually assumed to be of very simple kinds, even at the cost of very complex specifications of truth conditions.

This prejudice against structural investigation is especially remarkable in view of the manifest aptitude of the human mind for grasping structure, by contrast, for example, with its poor showing at computation. Our delight in music is one evidence of this and most of us, indeed, enjoy these complex sound patterns without any theoretical understanding of them, just as we can speak and write a language without any theoretical knowledge of linguistic structures. It would be more controversial to claim that appreciation of painting or sculpture turned upon apprehension of structure, but for architecture the case requires no argument; one has only to recall the enormous importance always accorded to proportion by architectural theorists, from ancient Greece through Renaissance figures like Alberti and Palladio to modern masters such as le Corbusier. Without our apprehension of structure there would not even *be* any computation, for the subject-matter of pure mathematics, upon which applied mathematics depends, is, precisely, structure. So an account of meaning which emphasizes structure is *a priori* far more credible than one which stresses computation.

The one really great success story of modern logic should also have been a warning against this lack of interest in structure. The failure of logicians in the late middle ages to give a correct account of generality – specifically, of the logical relationships of propositions containing more than one general term, such as ‘every’, ‘few’, ‘some’, etc. – was overcome by Frege in the late nineteenth century thanks to a new structural description of general propositions (to be explained in detail in the sequel). And whereas medieval logicians, relying on over-simple structures, tried to compensate with more and more complex specifications of the conditions for valid inferences, Frege, operating with more complex structures, was able to offer a simple account of validity.

Taking Frege as my guide, then, I have tried to develop aspects of his structural analysis of language with respect to meaning which remain implicit within his work. This stage is reached in chapter 4, which is the pivot of the work. It is preceded by three chapters in which I survey the contributions made by linguistics, logic and computer science respectively to the representation of meaning. Conveniently, although perhaps slightly artificially, I have linked each of these disciplines with a particular type of formal grammar: linguistics with string grammars, logic with tree grammars and computer science with graph grammars. These grammars proceed in order of complexity, which has determined the order in which the contributions of the three disciplines are presented.

Cambridge University Press

978-0-521-43481-2 - Structures and Categories for the Representation of Meaning

Timothy C. Potts

Frontmatter

[More information](#)

Preface xiii

I have not, of course, attempted a general survey of each discipline's contribution to the study of meaning in general, but have singled out what each has to offer by way of structural analysis, as that alone is germane to my purpose.

In the remaining three chapters, I diverge from Frege, calling into question, first, his treatment of count nouns as disguised intransitive verbs (chapter 5) and, second, his use of proper names as the basic category of his system (chapter 6). I propose an alternative categorization for both count nouns and proper names, so a final chapter re-works the ground covered by chapter 4 in order to make the necessary modifications, with some extensions.

It is a matter of considerable regret to me that I have been unable to include a treatment of temporal expressions, which occur in the majority of contingent propositions. This lack consequently inhibits practical application of the system of representation proposed here; I hope to remedy it at a later date. Meanwhile, I have given a brief taste in the Epilogue of how categorial graphs might be used to handle a long-recognized stumbling block for Frege's ideography, adverbial modification.

Computer scientists who look for a notation which can be implemented immediately on a machine will also be disappointed to find that, while I argue for distinct, though related, structural analyses with respect to meaning and with respect to the accepted forms of expression in a particular language, I restrict myself entirely to the former, thus leaving one side of the representation problem untouched. This is properly a task for linguists but, if the ideography which I develop here is on the right lines, their current proposals would demand substantial modification.

With the exception of the first section of each of chapters 1-3, argument and notation proceed hand in hand throughout this book. This is essential to my purpose, since a notation is, precisely, a means of representing structures of a certain kind. A discussion of structure must, therefore, involve an ongoing discussion of notation. To set out the final notation at the beginning would be tantamount to assuming from the outset everything that the book sets out to justify. Some readers may find the structures which I discuss difficult to grasp: in my experience, some people find it much easier to apprehend auditory structures, others visual structures. I myself am in the latter group, and so my representations are primarily visual. This may present an obstacle to those who need a notation which they can pronounce.

In addition, with one exception (in section 7.1), I am *only* concerned with structure, so that the reader who looks for full specifications of truth conditions will be disappointed. Although structural analysis must

Cambridge University Press

978-0-521-43481-2 - Structures and Categories for the Representation of Meaning

Timothy C. Potts

Frontmatter

[More information](#)

xiv Preface

constantly advert to questions about truth and inference, it does not require a full specification of truth conditions; the structural analysis is, rather, a precondition for the latter. Moreover, a system for representing meaning has many uses for which a detailed specification of truth conditions may be unnecessary, for instance machine translation, expert systems (see Galton, 1988). This is fortunate, since experience shows that spelling out the truth conditions of propositions of everyday language is an enormously difficult task. To do so for the range of constructions considered in this book would be a totally unreasonable demand; I hope, by the end, to convince the reader that structural analysis with respect to meaning is both demanding and worth-while in its own right.

NOTE ON NUMBERING OF EXAMPLES

Examples are numbered consecutively, beginning anew with each chapter. Analyses of examples are given the same number as the example itself, followed by a letter: P for a phrase marker, L for a representation in linear notation (but F if the representation is based on Frege's principles), LF for the 'logical form' of transformational grammar, and S for shallow structure. Graphs are numbered in their own sequence (G1) etc.

Cambridge University Press

978-0-521-43481-2 - Structures and Categories for the Representation of Meaning

Timothy C. Potts

Frontmatter

[More information](#)

Acknowledgments

My thanks are due to Professor David Holdcroft for encouraging me in this enterprise and for reading an earlier version; to Mrs Stella Whiting for useful criticisms, one of which persuaded me to change substantially my account of demonstratives; to Mr Brandon Bennett for comments and information which have helped me especially in the chapter on computer science; and finally to three publishers' readers, whose names I do not know, for criticisms which led to a major revision of an earlier version. I am also much indebted to a publisher's reader of the penultimate version, who submitted a very detailed report which has prompted several excisions and a few additions to the main text as well as many footnotes.