Chapter 8

Conclusions

8.1 A Summary of the Thesis

This thesis addresses an important problem for theories of discourse coherence: the lack of a standard, well-motivated set of discourse relations. While the general idea of coherence relations has proved extremely useful in many theories and many text processing applications, no solid conception has emerged about what it is that relations actually represent, or how to go about defining them.

The solution proposed in this thesis rests on a conception of relations as modelling psychological constructs operative in writers and readers when they are processing text. This conception is fleshed out with reference to Rosch's notion of the **basic level** of categorisation, and to the notion of **action schemata** as used in theories of skilled task performance.

It is argued that evidence for these constructs can be sought in a study of the connective **cue phrases** found in a given language. If relations are actually communicated between the writer of a text and its reader, then it makes sense for there to be resources in the language for signalling relations explicitly. While relations can sometimes be inferred by the reader from context and background knowledge, there is no reason to suppose that any relation exists which will *always* be thus inferrable.

Based on these arguments, a methodology is proposed for justifying a set of relations. The methodology centres around two simple linguistic tests. The first is a **test for cue phrases**, which is used to gather a corpus of some 200 cue phrases from a sample of naturally-occurring text. The second is a **test for substitutability**, which is used to organise the corpus of cue phrases into a hierarchical taxonomy. This taxonomy is created without buying into any particular theory of discourse, but it provides an extremely rich source of information from which such a theory can be motivated.

The taxonomy lends itself to a conception of relations as **feature-based constructs**. The substitutability relationships in the taxonomy each have a natural feature-theoretic interpretation, which means that extracts from the taxonomy can be used separately to motivate the individual features which are the components of relations. Some guidelines for creating feature definitions are laid down, and a number of specific definitions are then motivated one by one. The features eventually motivated prove useful in analysing a wide range of cue phrases.

The set of relation definitions is conceived as an overlay on the set of cue phrase definitions. There remains some work to be done in deciding exactly how to map one set onto the other; but in any case, most of the 'hard work' will have been done once the cue phrase definitions are completed. At this point, all of the important dimensions of variation for relations will have been established, and it will just be a question of deciding whether or not *each* cue phrase is in one-to-one correspondence with a relation. Some guidelines for answering this final question have been set out.

8.2 The Contributions of the Thesis

The thesis delivers on two levels. Its most tangible contribution is the table of cue phrase definitions set out in Appendix D. These definitions can be taken to form the basis for a new set of relations to be implemented in text processing applications, or used by discourse theorists as the basis for further research. The new definitions differ significantly from existing sets, and contain some novel ideas. While several studies suggest that relations are composite constructs, this is the first to propose a set of *independent* features to analyse them, in which the order of the decisions about feature values is not constrained. Moreover, the feature definitions are expressed in relatively simple terms—representing alternative feature values is often just a matter of choosing different bindings between variables—and they should eventually lend themselves well to implementation. Some of the feature definitions are innovative extensions of existing work; in particular the new SEMANTIC/PRAGMATIC distinction and the new distinction between POSITIVE and NEGATIVE POLARITY. Finally, the use of defeasible CAUSAL and INDUCTIVE rules in the definitions is promising as part of an account of how relations are grounded in more general principles of cognitive economy. The new definitions are thus in tune with the suggestion in Hobbs' opening quote, that coherence relations should be thought of as 'instantiations in discourse comprehension of more general principles of coherence that we apply in attempting to make sense of the world we find ourselves in'.

However, the main purpose of the thesis is not to put forward a completely worked-out set of relation definitions. It is rather to consider the question of how a set of relations should be justified in the first place. The primary contribution of the thesis is the methodology proposed for motivating a set of relation definitions; the definitions themselves are intended first and foremost as an implementation of this methodology.

As such, they can certainly be contested. The corpus of cue phrases can likely be enlarged with new phrases. Exceptions might be found to some of the relationships in the current taxonomy. The relationships in the taxonomy might be better modelled by altering the set of features. Such changes, made within the framework of the tests for cue phrases and for substitutability, do not damage the substance of the thesis. Indeed, the tests provide a useful forum for discussion about the set of relations. If the substitution methodology is accepted, then disagreements about relation definitions become disagreements about the interpretation of concrete linguistic examples, rather than about intangible first principles.

8.3 The Substitution Methodology: A Balanced Verdict

The thesis therefore stands or falls on an assessment of the substitution methodology. Such an assessment can be made from several different standpoints, which will be considered below in turn.

8.3.1 The Arguments for the Methodology

Firstly, the arguments on which the methodology rests can be evaluated. The main argument is that the cue phrases in a language will tell us about the mechanisms used by readers and writers of that language. As noted in Section 3.6.1, it is unusual to propose an investigation of psychological mechanisms by any means other than psychoplogical experiments. However, experiments which investigate psychologically real relations must make hypotheses about the behavioural indicators of relations, and these hypotheses are themselves contentious. It is notoriously difficult to interpret the behaviour of, say, a writer, in terms of a theory of writing. Faced with this difficulty, it is surely permissible to look at the *medium* in which writing and reading occur—namely language—to find out something about these tasks. Language is not adopted arbitrarily by those who read and write; its evolution is inseparable from that of the tasks themselves. It would be surprising if it did not contain valuable information about how the tasks are performed.

This is not to say that the substitution methodology obviates the need for empirical experiments on readers and writers. On the contrary, the two approaches complement each other. The arguments used to support the substitution methodology also act to legitimise the use of cue phrases as an experimental window on relations. And theorising about the substitutability relationships in the taxonomy can be thought of as a systematic way of generating experimental hypotheses to test.

8.3.2 The Practicability of the Methodology

The practicability of the substitution methodology should also be considered. Are the tests easy to use? Do different testers come to the same conclusions? The approach in this thesis has been to assume that they will—in keeping with much work in linguistics, the examples of the operation of the tests are presented on the assumption that readers will agree with them. However, it would be a good idea to put this assumption to the test in an experiment comparing the decisions of several testers in particular cases. In the case of the substitutability test, a fairly high degree of consensus is predicted. Nevertheless, in cases where there is disagreement, we can resort to the kind of experiment described in Section 7.1.3, which examines the influence of alternative cue phrases on the time taken to answer different questions about a text.

8.3.3 The Results of the Methodology

Finally, the substitution methodology can be assessed by looking at the set of relations which it serves to justify.

A key result of the methodology is the motivation of a feature-theoretic approach to relation definitions. Most previous classifications of relations have taken one particular dimension of variation to be dominant—the 'top level' of classification varies from theory to theory, as was shown in Chapter 2, but successive classifications do not seem to improve on one another.

The taxonomy of cue phrases prompts a different categorisation of relations. Several dimensions of variation are identified, but no single dimension is taken to be dominant. A conception of relations as unstructured collections of features falls quite naturally out of the taxonomy of cue phrases, where nearly all of the variation between phrases is found at the lowest levels. This feature-based classification promises to provide a much better fit for the data. What is more, the only other study starting from a conception of relations as cognitive constructs (that of Sanders *et al*) also suggests their decomposition into orthogonal features, and does so on independent grounds.

The job of deciding on a set of features which make sense for *all* the various kinds of phrase in the taxonomy is, of course, a very difficult one. Some interesting generalisations have been noted in this thesis, but much work still remains to be done before a satisfactory set of features is produced. However, we have tried to avoid the temptation of concentrating on small subsets of phrases, and analysing these in isolation. While useful results can be obtained in this way, it is hoped that the findings in this thesis testify to the benefits of seeking a theory with much broader coverage.

The set of relations must also eventually be assessed in terms of its descriptive adequacy in describing coherent text. It is perhaps here that the main question mark about the methodology lies. As was noted in Section 7.2, the descriptive adequacy of the set of relations cannot be determined until an accompanying theory of focus is provided. It was argued that a theory of relations should not be saddled with all the explanatory work in a theory of discourse coherence; a theory of focus should also be involved to account for pairs of text segments whose relationship cannot be made explicit by any cue phrase. It remains to be seen whether such a theory can be devised, and how well the theories of relations and focus would interact. Clearly, this is a matter for further research.

8.4 Towards a Complete Account of Discourse Coherence

The present theory of relations is thus only a partial theory of discourse coherence. However, it provides a solid foundation on which a complete account can be based. Specific hypotheses have been proposed about the segments of a discourse which will be explained by relations—those which can be linked by cue phrases—and hence, about the parts of a discourse which some other metaphor will have to explain.

The emphasis has been on producing a compact theory whose constructs are systematically justifiable. Every relation is justified in precisely the same way: it is composed of a number of features, each of which is motivated in the same way from the substitutability relationships in the taxonomy of cue phrases. These relationships are in turn based on the pre-theoretical judgements of ordinary readers and writers.

The analysis of texts in terms of the theory is similarly grounded in pre-theoretical decisions. The decision about whether a relation applies between two spans of text is based on the decision about whether a particular cue phrase is appropriate to link them; it does not require the intuitions of a discourse analyst. Once the decision has been made, however, the complex definition of the relation provides a wealth of theoretical information about the discourse at that point, representing the intentions which underlie it, and the states in the world and the reader's world model which are requisite for their accomplishment.

The theory of relations is based on an analysis of a well-delineated class of textual phenomena. By examining how these phenomena are used by ordinary readers and writers, an extremely informative account of text is produced. It remains to be seen whether a theory of focus can be developed to similar standards.

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