

## INTRODUCTION

The essay is a systematic attempt to understand cognitive characteristics of translation by embedding its logical and analytic features in an appropriate pragmatic and hermeneutic environment. To explain communication breakdowns that often result from conceptual disparities between two cultures, certain devices of the latter kinds must even be explicitly integrated with analytic considerations. Others can be left in the background. From the analytic side I employ such things as the notion of possible world and some ideas and methods related to possible worlds semantics and general model theory. A simple – though not entirely noncontroversial – pragmatic environment will be provided by my attempts to explore translation in the framework of speech acts, in a generalized sense of the word. What makes it simple is that it will only be used as a cognitive setting without any engagement in sophisticated aspects of speech act theory; and what may make it controversial is the generalization of the notion of ordinary speech act and its association with the idea of possible world. The nature of hermeneutic elements, on the other hand, and the way in which they cooperate with logical and pragmatic elements, will become apparent when we explore certain principles that seem to be involved in the understanding of speech acts.

The concept of translation that I investigate in this book will be called explanatory, for reasons to be explained below; but it is not translation in the standard sense of the word since it admits of meaning change. As we shall see, it can take various forms and degrees of precision, and therefore it can occur in contexts of different kinds: from everyday discourse to literary texts to scientific change. I try to argue that it has something in common with Thomas Kuhn's earlier conceptions of scientific change, or more generally, with his views of language learning.

The book is organized according to increasing logical complexity. Part One emphasizes pragmatic and hermeneutic elements of conceptual change and requires no formal sophistication whatsoever on the part of the reader. This part is self-contained, and it presents my basic ideas connected with explanatory translation and conceptual change,

especially with respect to natural languages. Part Two presupposes some knowledge of model-theoretic notation, but it does not contain any formal argumentation. The reader who is not familiar with this notation is advised to consult Part Three, which provides nearly everything that is needed. It also formally works out some results exhibited in Part Two. Part Three is formal, but the reader who does not want to become involved in such details can omit this part without sacrificing much of Part Two. A great deal of the developments in Parts Two and Three is based on my earlier work and it has greatly benefited from my earlier collaboration with David Pearce and from his highly important ideas on intertheoretic relations. Most of Part Two is more recent or new, in particular the discussions concerning cognitive science and emergence and the applications to quantum mechanics and chemistry. Much of the research concerning cognitive science that is presented in this part and the next one is based on Tere Vadén's valuable ideas and on my cooperation with him.

The contents of the book are as follows. In Part One, the motivation for and the basic ideas of the notion of nonstandard translation are put forward and some applications and examples presented. Chapter 1 introduces the problems of conceptual change to be explored in the subsequent chapters. This is mainly done here in reference to the history and philosophy of science. The chapter sets the stage for my task by dealing with questions of scientific progress and with the idea of the Correspondence Principle and its possible generalizations for other cultural developments.

More specifically, I investigate here Kuhn's earlier objections to the Correspondence Principle and try to point out that his proposal concerning reinterpretations of scientific terms has an aspect that is analogous to what I have in mind when I in subsequent chapters reconstruct intertheoretic and intercultural relations in terms of a nonstandard notion of translation. He does not make clear, however, precisely what he means and in his later work favors a more standard notion of translation, so one cannot be certain about what he had in mind in this matter.

In Chapter 2, nonstandard translation is investigated in greater detail. The standard view holds that, ideally, a translation must preserve meaning, sometimes perhaps reference. Since this requirement is useless, for obvious reasons, I replace it by the condition that there be

syntactic and semantic transformations which, together with certain principles of interpretation, take care of conceptual change. This generalized notion of translation has a formal predecessor in mathematical logic, and some recent forms of reduction occurring in the philosophy of science are also of that kind.

What I primarily try to show in this chapter is that the elements of the nonstandard notion of translation introduced here are implicit in everyday discourse. Therefore, I explore translation and interpretation in the context of ordinary speech acts. If, in particular, a given translation is of explanatory import, it will be called explanatory, and corrective if it corrects what is uttered by the speaker. I also make explicit certain principles of interpretation that seem to function in ordinary discourse, and present some examples from which we can see how these principles actually work. What is learned here is in later chapters enlarged so as to apply to more theoretical and global contexts.

Chapter 3 explores examples and applications of local translation, that is, assuming that a hearer translates single or just few utterances – rather than longer texts or even whole languages – having more comprehensive parts of a language only as a contextual element. This is typical for speech act contexts to which the name ‘speech act’ applies in the original, narrow sense of the word. I try to systematically sort out the different types of local translation and apply the result to understand better what is going on when people use metaphors or advocate different theories of perception or different views of artistic change. Though these fields of application seem to be conceptually far from each other in many ways, it turns out, I hope, that the present notion of translation makes their similarities and differences more transparent.

Chapter 4 turns the reader’s attention to global translation. In the previous chapter, explanatory translation was considered in the local sense. However, when translating scientific or literary texts syntactic and semantic aspects must be explored more globally. In this chapter, I briefly investigate interpretation and nonstandard translation in connection with narratives, and, furthermore, consider special characteristics of the notions of truth and satisfaction relative to narratives, by keeping an eye on possible worlds semantics.

Part Two continues to study global translation, this time in refer-

ence to scientific theories and logics. When earlier chapters sort out the components of nonstandard translation in the local sense and then generalize the reconstruction for global cases, Chapter 5 shows how this generalization leads us to the notion of a correspondence relation of theories. The most intricate kind of correspondence is the so-called counterfactual correspondence, since it (intentionally) involves contrary-to-fact auxiliary assumptions. It will be seen in later chapters that this notion, especially its special case, limiting case correspondence, plays an important role in many actual cases of scientific change, which Kuhn calls revolutionary. The correspondence relation is considered in this chapter both in connection with nonformal theories, such as historical narratives, and formalized ones.

In the literature there has been some discussion about connections between correspondence and symmetries, i.e., invariance properties, in science. In Chapter 5, I also try to place the discussion in our model-theoretic framework. Furthermore, the concept of correspondence and that of translation in the more general sense are related to some problems of definability, on one hand, and to the intricate notion of emergence, on the other.

In Chapter 6 we investigate whether or in what sense correspondence, as defined in the preceding chapter, is of any explanatory import in science. In particular, I consider what I call counterfactual explanation, which involves contrary-to-fact assumptions and counterfactual conditionals. It is pointed out that on relevant pragmatic and logical conditions, such an explanation can be derived whenever a counterfactual correspondence is available. Since the notion of translation employed here is more liberal than the standard one, it can be used to go beyond Kuhn's criticism in the study of intertheoretic explanation. In this chapter, also some questions of explanation concerning mathematical theories and logics are investigated in the light of the correspondence relation.

Chapter 7 – which is the longest chapter – is devoted to case studies. We investigate some cases of scientific change, many of which are well known from, and much discussed in, recent history of science and recent history of logic, and point out that our notions are applicable to them. Whether an application of the correspondence relation, particularly of the counterfactual one, is of explanatory import in these cases is very much dependent on relevant pragmatic and herme-

neutic conditions. I also sketch here a limiting case correspondence between symbolic and connectionist representations in cognitive science. A large part of this chapter investigates problems of cognition, of which the most interesting one (to me) is how propositional and nonpropositional knowledge might be related to each other. What is found out here is then applied to questions of epistemic logic and to the problem of emergence.

Most of the formal investigations and foundational studies of this book are gathered in Part Three. In its Chapter 8 I present the logical notation employed in some earlier sections and the formal and mathematical principles needed in the exact treatment of the case studies worked out in the next chapter. The idea is that this essay would be logically self-contained to the extent to which it is possible within reasonable limits. I attempt to choose exact tools that are able to cooperate with philosophical and pragmatic investigations. This conforms to the program I suggested above, that is, that logical investigations ought to be integrated with explanations which are pragmatic, paradigmatic, and hermeneutic. I begin the chapter by discussing the role of logic – especially the import of some concepts provided by abstract logic – in metascientific study, keeping an eye on this program. I also make a historical digression where we can see that Rudolf Carnap's logical aims were largely similar to mine.

Chapter 9 is formally more demanding. Some of the case studies of Chapter 7, mainly presented there in a nonformal manner, remained sketchy since the relevant syntactic and semantic entities cannot be exactly delineated. Some can be worked out in model-theoretic terms, as I point out in Chapter 9, by using many-sorted infinitary logics and nonstandard analysis. This is methodologically desirable in that it makes it possible to employ ordinary mathematical language and yet guarantees that we have a formal language and general model theory at our disposal, in the framework of which relevant notions can be represented whenever needed. Due to the restricted methodological and logical aims of Part Three, sophistications pertaining to more specific model-theoretic results cannot be found in this or the previous chapter, but this part offers a framework in which such results could be worked out.

The Appendix of the book contains a survey of some basic concepts and results of definability. Its origin is in my early cooperation