

Prediction and Retrodiction

Prediction and retrodiction are properties of scientific theories. If a scientific theory is 'predictive,' it makes 'predictions' about observable facts. This means that, given the general principles that make up the theory, and given certain relevant material conditions, certain effects will be

observed. If these effects are indeed observed they 'confirm' the theory. If they are not, the failure constitutes a 'counterexample.' Counterexamples necessitate a revision of the theory in question, and if there are too many of them, the theory may have to be rejected altogether. The testing of predictions is thus a means of testing the theory.

Thus, given the principles of modern astronomy, and given a certain place *p* on earth, it is possible to predict that at some time *t* the moon will be between the sun and *p*, so that at *t* an eclipse will be observed at *p*. Some linguistic theories are predictive, notably grammatical and phonological theories, both at the language-specific and at the universal linguistic level. For example, if a universal theory of syntax *T* stipulates that in all or a certain class of languages, subjects may not be removed or deleted from a position immediately following a complementizer, a counterexample results when a language of the relevant class allows for sentences of the type *Who do you think that left early?*, where the subject of the *that*-clause, *who*, has been moved away from its original position and placed at the beginning of the sentence.

A scientific theory may also be 'retrodictive.' If it is it allows for 'retrodictions' concerning the causal factors that brought about an observed fact. For example, when a person dies medical theory may be able to retrodict, on the basis of some simple tests, that death has occurred as the result of a stroke, even though the same theory is unable to make a general prediction of death when a stroke occurs.

Retrodiction is a less interesting property of a theory when it is not taken to be a causal or realist theory but is interpreted in the instrumentalist sense, i.e., as a purely formal calculus. Instrumentalist theories tend to emphasize prediction much more than retrodiction.

The strongest scientific theories are both predictive and retrodictive. Not all theories, however, can achieve this level of strength. A theory is predominantly predictive when the observable phenomena in its scope allow for too many different possible causal origins. Although each causal chain possibly underlying a certain phenomenon may fall entirely within the scope of the theory, the set of possible causal chains may become so large as to be uninteresting. The theory is then weak on retrodiction. Conversely, a theory is only or predominantly retrodictive when the causal mechanisms of the phenomena in its scope are at least partly well-determined but there is no way of predicting whether the crucial causal factors will indeed occur. Thus, in social medicine, there is no way of predicting with certainty that a person who visits a malaria infested country will actually contract the disease. But if such a visitor does contract it, one can retrodict that it was caused by a mosquito bite. In general, when a theory is unable to take into account all the factors contributing to a state of affairs that is sufficient to cause a certain phenomenon, it must make do with retrodiction and give up the higher ideal of prediction. The historical sciences aim largely at achieving retrodictive success, prediction being, in most cases, unrealistic.

It is commonly required of linguistic theories that they be predictive. This is, however, a realistic aim only for those parts of linguistic theory where the causal parameters involved can be kept under control and the processes occurring are, accordingly, productive, as in grammar or phonology. Not so, however, in the lexicon, where one can

recognize a number of identifiable processes at work without being able to predict whether they will actually occur. For example, there is a well-known lexical process allowing English adjectives and verbs to be used causatively. Thus, the word *sad* is used causatively, meaning 'saddening,' in a collocation like *a sad story* or *a sad event*. This phenomenon is found and identified as such in a number of English adjectives and verbs, but not in others. And lexical theory has so far been unable to come up with general criteria that would predict that, and thus to some extent explain why, *sad* can be used causatively but not, for example, *nervous*—even though equivalents of 'nervous' in other languages do sometimes (as in Modern Greek) allow for causative use. All that lexical theory can do, in this case, is take note of the fact that, apparently, the causative derivation has been at work in *sad*, but not in *nervous*. The factors responsible for this difference are probably to be sought in the extremely complex fabric, past and present, of the society that has made English its language, and these factors have so far escaped the powers of any serious predictive theory. Typically, the more a phenomenon gets lexicalized, the less its occurrence can be predicted, and the more any theory dealing with such facts is forced to fall back on retrodiction. Seen from this angle, lexicology has much in common with the historical sciences.

The dominant trends in linguistic theory since the early 1960s or so have invariably emphasized the requirement of correct prediction of the facts concerned, at the expense of the requirement of correct retrodiction. This is no doubt one of the factors underlying the gross neglect of lexicology in modern linguistic theory.

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