Syntactics, semantics, and pragmatics are the three levels of investigation into semiotics, or the comprehensive study of systems of communication, as described in 1938 by the American philosopher Charles Morris (1903-1979). *Syntactics* studies signs themselves and their interrelations in abstraction from their meanings and from their uses and users. *Semantics* studies signs in relation to their meanings, but still in abstraction from their uses and users. *Pragmatics* studies signs as meaningful entities used in various ways by humans. Taking current written English as the system of communication under investigation, it is a matter of syntactics that the two four-character strings 'tact' and 'tics' both *occur* in the ten-character string 'syntactics'. It is a matter of semantics that the ten-character string 'syntactics' has only one *sense* and, in that sense, it *denotes* a branch of semiotics. It is a matter of pragmatics that the ten-character string 'syntactics' was not used as an English word before 1937 and that it is sometimes confused with the much older six-character string 'syntax'. Syntactics is the simplest and most abstract branch of semiotics. At the same time, it is the most basic. Pragmatics presupposes semantics and syntactics; semantics presupposes syntactics.

The basic terms of syntactics include the following: 'character' as alphabetic letters, numeric digits, and punctuation marks; 'string' as sign composed of a *concatenation* of characters; 'occur' as 't' and 'c' both *occur twice* in 'syntactics'. However, perhaps the most basic terms of syntactics are 'type' and 'token' in the senses introduced by Charles Sanders Peirce (1839-1914), America's greatest logician, who could be considered the grandfather of syntactics, if not the father. These are explained below. The basic terms of semantics include 'sense', 'denotation' and 'ambiguous'. The strings 'zero', 'one minus one' and 'three minus zero minus three' have different senses but the same denotation. An ambiguous string has more than one sense. For example, the string 'three minus two minus one' has two senses; in one sense it has the same denotation as 'three minus one', or 'two', and in one sense it has the same denotation as 'one minus one', or 'zero'. The basic terms of pragmatics include the following: 'inscribe', 'assert', 'report', 'ask', 'promise', 'describe', 'repeat' and 'imply'.

Peirce's type-token distinction dates from the first few years of the 1900s. Although he made the distinction earlier, his use of the words 'type' and 'token' to express it dates from the 1906 *Monist* article on pragmaticism, quoted in *Ogden-Richards* (*1923,* Appendix D, section 6, esp. 280-281) and reprinted in volume IV of *Collected Papers* (Paragraph 537).The following is from Peirce's 1906 *Monist* article (*1906*, 504-5).

> A common mode of estimating the amount of matter in a … printed book is to count the number of words. There will ordinarily be about twenty 'thes' on a page, and, of course, they count as twenty words. In another sense of the word 'word,' however, there is but one word 'the' in the English language; and it is impossible that this word should lie visibly on a page, or be heard in any voice …

Such a … Form, I propose to term a *Type*. A Single … Object … such as this or that word on a single line of a single page of a single copy of a book, I will venture to call a *Token*. …. In order that a Type may be used, it has to be embodied in a Token, which shall be a sign of the Type, and thereby of the object the Type signifies. I propose to call such a Token of a Type an Instance of the Type. Thus, there may be twenty Instances of the Type 'the' on a page.

I do not know whether Peirce ever supplemented his type-token distinction with the concept of "occurrence" as needed to make the point that, although the type 'the' has only one occurrence of the type 'e', the type 'e' occurs twice in the type 'thee' and it is instantiated, betokened, or embodied (to use Peirce's term) twice in every token of the type 'thee'. In order for two string occurrences in the same or different string-types to be occurrences of one and the same string-type, it is necessary and sufficient for them to be "character-by-character identical", i. e., for them to have the same length, say L, and for the nth character occurrence in one to be an occurrence of the same character-type that the nth character occurrence in the other is an occurrence of, for n between 1 and L.

Aside perhaps from Peirce, the most important figure in the history of syntactics was the Polish-American logician Alfred Tarski (1901-1983). Tarski needed an axiomatic syntactics for his axiomatic semantics. More specifically, he needed an axiomatic theory of syntactics as a foundation for an axiomatic treatment of his 1933 semantic theory of truth. One of Tarski's theorems is that the operation of concatenation of strings is associative: given any three strings x, y, z, concatenating x with the result of concatenating y with z is the same as the result of concatenating x with y and then concatenating the result with z. For example, concatenating 'syn' with 'tactics' is the same as concatenating 'syntac' with 'tics'. The mathematical theory of syntactics is called *string theory*. The history and philosophy of this important subject is dealt with in the article "String Theory" by J. Corcoran, W. Frank, and M. Maloney in the 1974 *Journal of Symbolic Logic*.

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