## 5.7

## Relevance, Pertinence, Recall, and Precision

In discussing information retrieval in IR systems and the formal criteria of the selection of documents, we talked about the output of this search process (i.e., the IR system selects documents required by the user). We have not called them pertinent, although this term was used in Chapter 4. The reason is that pertinent documents are normally understood as those corresponding to the user's information need (from the user's point of view). However, in IR systems, the user does not take part in the information retrieval. Hence, the documents selected by the system (according to formal rules) cannot be classified as pertinent documents. For this reason, in information science documents "needed by the user," with the "need" determined (on the basis of the search request given by the user) using some method by anyone other than the user, are called *relevant*.

Throughout its history (probably dating back 4000 years), information retrieval has always dealt with relevant documents (that is, long before "needed by the user" acquired the terminology "relevant"). However, as the understanding of the nature and properties of information needs has improved, the term "relevance" has acquired different meanings. The exact meaning of this term when used by authors in different articles was often not obvious. This term is used not only in the retrieval of the documents for the output but also for the evaluation of document quality as well as the quality of the IR system. In general, "relevance" is one of the most frequently used terms in scientific publications discussing IR systems. Therefore, we would like to consider it in more detail.

As a rule, when speaking about "relevance," authors imply one of the following three meanings (see, for example, Barry, 1994; Howard, 1994; Jones, 1994; and Park, 1994). The first meaning corresponds to the formal generation of the output in the system, that is, to the formal criterion for the selection of documents required by the user. The second refers to the expert's evaluation of the output formed in the system and hence to the evaluation of the entire system. The third meaning of the term coincides with that of "pertinence" as used by some authors; that is, they use "relevance" instead of "pertinence" meaning "pertinence."

Let us first consider the generation of the output. It is clear that essentially the formal criterion for the document selection constitutes the criterion to select relevant documents, that is, documents required by the user. Indeed, the goal of IR systems developers is to retrieve documents that are of interest to the user. Recall from Chapter 2 that the user is interested in documents that contain the required information. The extent of the user's interest in the document depends on the amount of information it contains that satisfies the user's IN. Thus a formal selection criterion using a specific system constitutes a concrete rule to

determine the relevance of documents. Obviously, this rule can be successful to a different degree, but it is the developer's choice to have the computer perform the relevance evaluation. This is probably the very essence of the IR system creation, and it is the meaning of the assertion that IR systems find only relevant documents.

This particular meaning of the term "relevance" is greatly debated. But still some investigators suggest that documents found by the IR systems should not be called relevant. In other words, there is a desire to reduce the number of meanings of this term. For example, Lancaster proposes that instead of using the term "relevance" one should "simply refer to document representation, 'matching a search strategy' and documents 'matching an intended strategy'" (Lancaster, 1979). However, more investigators propose to call selected documents *formally relevant* and, speaking about the situation under consideration, they use the term *formal relevance*. Thus, they separate this situation from that corresponding to the most frequently used meaning of the term "relevance." The latter is considered next.

The most frequently used meaning of the term—and probably the universally adopted one—is connected to the expert's evaluation of documents retrieved by the system. Actually, it is the expert who decides on the relevance of a retrieved document (its need by the user) or its irrelevance (it is not needed by the user) after reading it. Usually it is decided during the evaluation of the information retrieval efficiency. Of course, in order to decide the relevance of a document the expert should know what the user requires. As a rule, such knowledge is formed after the expert has read the user's search request. It is after reading the request that the expert acquires an understanding of the user's IN. This IN may differ from the IN the user has tried to express, as well as from the IN the user has managed to express. We illustrate this point in Figure 5.5.

In this figure we give a model of possible situations concerning the user's IN. In part (a), a certain *ideal* IN, *A*, is presented. Such an IN could appear when in the course of activities the user encounters an uncertainty in the behavior of the algorithm. In other words, if after facing the uncertainty the IN *A* has appeared and if the information satisfying *A* has been found, this behavior uncertainty would have been completely eliminated. Part (b), together with IN *A*, shows IN *B*, which has really appeared instead of ideal IN *A*. In this case, the *actual* IN, *B*, is more "narrow" than the ideal one (although it is possible to have other relationships between *A* and *B*). Therefore documents corresponding to parts (k) and (l) of the ideal IN *A* do not correspond to the emergent IN *B*. However, this case will be discussed later when considering pertinence. Recall from Chapter 2 that the actual IN *B* is a certain psychological condition of the user with boundaries that are not well defined (information need of type POIN). That is why in part (c) of Figure 5.5 we show the *perceived* IN represented by the area C. This is a kind of IN that the user really perceives. The areas $x$, $y$, and $z$ are also rather interesting, but they will be considered later when we discuss