It is obvious that an IN is directed to some object or phenomenon of the world surrounding us. However, the thematic boundaries of this mental state are not always clearly defined. In fact, in satisfying an IN we always strive for clarity. But clarity ensues only when we can make a decision using obtained information (that is, we must either decrease the uncertainty in the behavior algorithm or achieve final goal). In other words, with the achievement of clarity, the process of satisfying a concrete IN is concluded. However, in many cases we cannot know beforehand exactly what information leads to the achievement of clarity. We want information, we want it very much (displeasure), but unfortunately we do not always know exactly what we want. This occurs because we imagine only the final product, the results of our physiological desire, and do not imagine exactly what information can lead to this result (pleasure). Only by obtaining information and juxtaposing it with available knowledge (with those patterns stored in memory) do we either elevate our knowledge to a level of clarity or make certain that the obtained information is insufficient, leading us to continue the process of collecting it (the process of satisfying an IN). Also, under the influence of the obtained information, the thematic boundaries of the IN itself can be changed. Thus, for imprecise thematic boundaries, the feedback mechanism distinctly appears in the process of satisfying the IN.

The model previously described is not just theoretical. Figure 2.1 illustrates the availability to the user of types of IN with or without precise boundaries. The "perception" of an IN is possible in those cases when the user *expresses* it. The expression of an IN is understood to be a process that results in a record of information about the IN that is obtained in some language. A *record in a*

Part (a)

1. How many periodicals did the New York public library receive during the last month?
2. What is the melting temperature of lead under standard conditions?
3. What was the most expensive annual tuition at a private university of the United States in 1994?
4. What was the closing gold quotation at the New York Stock Exchange last Wednesday?

Part (b)

1. How are statistical methods applied in interpreting experimental results?
2. How can malignant tumors be treated?
3. How can information needs be satisfied?
4. Can translation be automated?

Figure 2.1
Examples of queries representing various types of IN.

natural language, obtained as a result of a user's attempt to express his or her IN, will be called a *query* or a *search request.*

A first glance at the lists in Figure 2.1 already indicates that *different groups of queries—(a) and (b)—possess different characteristics.* In fact, the IN expressed in the first four examples is different from the IN expressed in the next four examples. If an IN of the first type (the first four examples) has thematic boundaries that are completely determined, and if as the result it can be expressed exactly, then the second type of IN (the second four examples) has boundaries that are not precisely determined, and it cannot be expressed exactly. In fact, if any group of users asking the fourth query in part (a) is given an answer (the required gold rate is named or a document given in which this rate is indicated), then each member of this group (under the condition that the query still interests them until the answer is obtained) will find the obtained data interesting, and it is not at all important how they react to the obtained information. In part (b), users asking the same query and obtaining an identical answer (for example a document or documents) can give, as is well known, completely different evaluations of obtained data.

Another difference in the types of IN under consideration is that if only one answer is necessary and sufficient to satisfy an IN of the first type (for example, any of the available documents containing the required information), then to satisfy an IN of the second type, most often all available documents of interest to the user prove to be insufficient. A consequence of this property is that upon obtaining the appropriate document, both the query and the need of the first type disappear. It goes without saying that this occurs when an IN of the first type is represented by only one query. Otherwise, the query disappears, and the IN of the first type diminishes as much as it was represented by this query. In the second case, the obtained information (for example, some set of documents of interest to the user) generally changes an IN of the this type and develops it, and the query remains for an extended period of time.

The next distinction (property) emphasizes the fact that much less intellectual power is required to perceive the information that answers an IN of the first type than is needed to perceive the answers of the second type. In fact, it is not difficult to evaluate the answer to the question of how many periodicals were received by the New York Public Library (second query, first type of IN). However, to investigate the operation of a new algorithm for translating a text from one natural language to another (fourth query, second type of IN) is quite difficult.

Another important distinction is the fact that formulation of queries for an IN of the first type does not present the user with a particular difficulty, whereas in the second case, as a rule, it is far from simple.

Following the accepted terminology (see Frants & Brush, 1988) we will call an IN of the first type a *concrete information need* (CIN) and an IN of the second type a *problem oriented information need* (POIN). It is not difficult to imag-