

INFORMATION RETRIEVAL *I*NTERACTION

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Definitions, References & Subject Index

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Aboutness. Fundamentally, the concept refers to ‘what’ a document, text, image, etc. is about, and the ‘who’ deciding the ‘what’. Several definitions exist. In this book, aboutness is dependent on the individual who determines the ‘what’ during the act of representation. Aboutness is divided into *author aboutness*, *indexer aboutness*, *user aboutness*, and *request aboutness* (p. 50)

Author aboutness. The *aboutness* determined by the author through natural language representation, e.g. by the use of a variety of partial match techniques or other NLR methods. For instance, an author-generated abstract mirrors author aboutness. If the method of representation transforms terms or concepts, the aboutness is *indexer aboutness* (p. 50).

Categorial classification (or relations). To categorize objects of any kind in a hierarchical and abstract manner, e.g. by means of generic or part-whole relationships. Individuals performing categorial classification selects an abstract concept and choose the objects which can be included under this concept. For example, a person chooses ‘tools’ to cover hammer and saw. Related to *situational classification*. (p. 128–129).

Cognitive model (individuals). A model of the individual itself and its environment, images, expectations, emotions, intentionality, experiences, imagination, intuition and values, as well as *conceptual knowledge* of domains, including affective domains, cognition, perception, and *work space*, *state of knowledge*, *problem space*, and *state of uncertainty* (p. 131–133).

Cognitive models (of IR activities or information systems). Models demonstrating the influence and interaction of *knowledge structures* (or cognitive structures) taking part in information transfer and *IR interaction*, or being imbedded in *IR systems* or *intermediaries* (p. 134).

Cognitive structures, see *Knowledge structures*

Cognitive viewpoint. An epistemological view. Its central point is that any processing of *information*, whether perceptual or symbolic, is mediated by a system of categories or concepts which, for the information processing device, are a model of his/its world – whether the device is a human or a machine. According to this view, the ‘world model’ consists of *knowledge structures* (or cognitive structures), which are determined by the individual and its social/collective experiences, education, etc. The cognitive viewpoint is born out of investigations of human mental behaviour; computers (and their behaviour) are seen as non-semantic manifestations or simulations of certain human mental processes, but not all (p. 16–19).

Cognitivism. The epistemological view that the brain is (regarded as similar to) a digital computer and that the human mind is (regarded as similar to) a computer program. According to this view, and in contrast to the *cognitive viewpoint*, the thinking process is information processing, that is, symbol manipulation only, and human mental activities are carried out as if they are processed in computers. Cognitivism does not claim, unlike the related position of ‘strong AI’, that computers have feelings and thoughts (p. 19–25).

Conceptual knowledge. *Knowledge* of domains, work tasks, topics, concepts and concept relations, as well as emotions, intentionality, expectations, and experiences (p. 36, 136–145).

Delta problem (δ -problem). The empirical fact that a conceptual ‘distance’ often exists between an information need, as represented in the actual user’s mind, and the user’s *request* formulation(s). Requests may consequently take the form of *labels* (p. 116–118).

Episodic memory. Those parts of the human memory (long term memory) which refer to *knowledge* of (or *information* about) particular events experienced by the individual. The concept is related to *semantic memory*, and is eventually intermingled with *situational* and *categorical classification* (p. 124).

Front-end. An *intermediary* mechanism placed (locally) in front of one or several remote online hosts' *IR systems*, and providing access to such systems. Often, it may support the user conceptually during retrieval of *potential information* from the host(s)' databases and information systems. In this book the term 'front-end' is not used, but replaced with the concept *intermediary* mechanism.

Indexer aboutness. The *aboutness* determined by an indexer or indexing device, implying a natural language analysis which results in a transformation of original terms and concepts into those accepted by the indexer or indexing device. The use of controlled vocabularies or a thesaurus will result in indexer aboutness (p. 51–52).

Information. The concept of information, from a perspective of information science, has to satisfy dual requirements: on the one hand information being the result of a transformation of a generator's *knowledge structures* (by intentionality, model of recipients' states of knowledge, and in the form of signs); on the other hand being something which, when perceived, affects and transforms the recipient's *state of knowledge*. Information is seen as supplementary or complementary to a conceptual system that represents the information processing system's *knowledge* of its world. If only the first condition is met, we are talking about *potential information*, i.e. data or similar entities stored in *IR systems*, that is of potential value to recipients (whether humans or machines) (p. 30–37).

Information retrieval. The processes involved in representation, storage, searching, finding, and presentation of *potential information* desired by a human user (p. 49).

Information space. That part of information systems which consists of *potential information* associated with the *system objects*, structured according to the *system setting*. In the case of *intermediary* participation, the space is extended with this component's *knowledge structures* (p. 134–136).

Intelligent IR. A particular approach to *knowledge-based IR* which attempts to solve *information retrieval* problems by application of expert system-like solutions. Intelligent IR relies heavily on user and request model building (*pre-search interviewing*) prior to automatic retrieval inference, and builds on the idea of real natural language understanding with respect to *requests* as well as to the intrinsic language processing (p. 178–181).

Interface, see *User interface*

Intermediary (human or machine). A person or a mechanism placed physically between *IR system(s)* and actual user with the purpose to transform interactively *requests* for information into *query* formulations that suit the retrieval components of one or several IR systems, to model and support the actual user as to his information need and underlying goals, and to provide information of potential value to that user from IR systems. These and other functionalities are dependent on the actual level of the *conceptual knowledge*, IR knowledge, and communicative skills present in the mediating person or mechanism. The functionalities particularly addressing the user are named the *user interface*. The intermediary may be placed locally as a *front-end* to one or several IR systems, or it may be in full control of (being part of) the underlying IR system's *system setting* and *system objects* (stand-alone systems) (p. 87–91, 136–140).

IR interaction. The interactive communication processes that occur during retrieval of *information* by involving all major participants in IR, i.e. the user, the *intermediary*, and the *IR system* – the latter consisting of *potential information*, mainly in the form of text and text representations as well as *IR system setting* (p. 134).

IR system. An information system which is constituted by interactive processes between its *system objects*, *system setting*, and the environment, capable of searching and finding *information* of potential value to an actual searcher of information (p. 16, 147–148).

Knowledge. An individual's total understanding of itself and the world around it at any given point in time, incorporating (sub)conscious memory, thinking and cognition, as well as emotional and intuitive properties. *Knowledge* is *structured* in a variety of ways and displays semantic as well as pragmatic characteristics. In contrast to computers and other man-made mechanisms storing

data, human knowledge and knowledge structures are capable of self-regulation and acute, non-predetermined transformations, based on self-generated expectations. Being perceived, *potential information* may, in the form of *information*, affect and transform knowledge (p. 30–34).

Knowledge-based IR. The *cognitive viewpoint* applied to *IR interaction* in IR research and applications. The concept implies viewing all communication processes that occur during *information retrieval*, as interactive processes between the individual *knowledge structures* implemented in *IR systems* and *intermediaries*, as well as forming part of an actual user's *cognitive model* (p. 160–202).

Knowledge structures. (or cognitive structures). The system of categories and concepts which, for an information processing device – whether human or machine – constitute his/its model of the world, i.e. the *knowledge* of the device. At any given point in time, the actual knowledge structures are determined by the individual and its social/collective experiences, education, etc. In *information retrieval* one may operate with *conceptual knowledge* as well as 'IR knowledge', that is, knowledge of *System setting* and IR processes, i.e. knowledge of search strategies, request modelling, IR tactics, etc. (p. 16, 135–140).

Label effect. The phenomenon that *request* formulations may often consist of one or several concepts which are of a more general nature or out of the context which constitutes the real information need. Thus, the label effect is a manifestation of the *delta problem* p. 116–118).

Potential information. Those data structures which are the result of a transformation of a generator's *knowledge structures* (by intentionality, model of recipients' states of knowledge, and in the form of signs). *IR systems* contain potential information, or *information* metaphorically speaking, that is, information of potential value to recipients. When perceived, it may affect and transform the recipient's current *state of knowledge*. Only if effect and transformation take place has the system provided information (p. 31–33).

Pre-search interview. The preliminary stage during *information seeking* in which the *intermediary*, without actually interrogating the *IR system(s)*, communicates with the user in order to obtain request formulations, to define the information need and subject areas (for database selection) of relevance to that need, and to model the actual user's attributes and goals. The objective underlying pre-search interviewing is to carry out request and user model building prior to actual (often costly) retrieval performance. During the proceeding *information retrieval* processes, the communication between user, intermediary and IR system(s) is called 'search interviewing' (p. 105–112).

Problem space (individuals). A situation specific state of mind in which the individual recognizes lack of *knowledge*, e.g. in order to choose between possibilities of action, of solution to problems, or in relation to fulfilment of factual or emotional goals. The problem space forms part of the actual *state of knowledge* and the *cognitive model* of the individual at any given point in time and may change properties through time (p. 27–28, 131–133).

Query. A transformation of a *request* formulation made by an *intermediary* (mechanism) in order to interrogate an *IR system's* conceptual objects. Boolean expressions, as well as the result of NLP or partial match technique algorithms, are regarded as queries. Only if no transformation takes place are the request and query identical concepts (p. 56).

Request. The formulation of the information need, or the underlying goals, as provided by the actual user to an *intermediary* or directly to an *IR system*. If directly formulated according to an IR system's retrieval technique, the request is identical to a *query* (p. 56).

Request aboutness. The *aboutness* of the *request* formulation. If not transformed into any new structure or concepts, the aboutness is determined by the user. If a transformation takes place during processing of the request, e.g. by the *IR system* or the *intermediary*, the aboutness is related to *indexer aboutness*, and the request transforms into a *query* (p. 52, 56).

Semantic memory. Those parts of the human memory (long term memory) which refer to the class of *knowledge* (or *information*) characterized by the definitions of concepts that people have acquired during their experiences of the world. Semantic memory is dependent on the individual's socio-cultural experiences, education, etc., and may demonstrate conceptual relations and definitions shared by many individuals (collective *cognitive structures*), e.g. within particular social groups. The fundamental role of, for instance, primary schools and universities is to generate shared knowledge and semantic memory (p. 124–140).

Semantic values. Linguistic interpretations of a sentence in a text. Through (morpho-)syntactic analysis, one or several possible 'explicit' interpretations can be made out of a sentence. For example, the sentence 'Time flies like an arrow' may contain at least four different explicit semantic values. For each explicit value a set of 'implicit' semantic values may exist: the user-generated associative interpretations; the potential values (meanings), generated by that additional context which is not present in the explicit value. The former implicit value refers to interpretations associated by a reader, e.g. that 'time flies' (insects) like (to approach) the (flower called) 'arrow'. The second implicit value type refers to the lack of syntactic roles, e.g. the time-place roles in the sentence. For instance, that the 'time flies' only like to approach the 'arrow' in the month of 'May' (p. 196–198).

Situational classification (or relations). To categorize objects of any kind in a process or event-related structure of concepts. Individuals performing situational classification involve the objects in different concrete situations, thereby grouping objects together, e.g. 'hammers are used to hit nails driving them into wood when building houses'. 'Related terms' in a thesaurus consist mainly of situational relations. Related to *categorial classification* (p. 128–129).

State of knowledge (individuals). The state of the individual's *cognitive model* and *work space* which, at a given moment, holds what is known and emotionally experienced by the individual, including its attention, actual intentionality, as well as its *problem space* and *state of uncertainty* (p. 131–133).

State of uncertainty (individuals). A state of conscious doubt in which the individual's own *state of knowledge*, *work space* and *cognitive model* cannot fill the *problem space* by thinking, causing interaction with the world around it to obtain supplementary *information*, e.g. by accessing an *IR system* (p. 27–28, 131–133)

Supportive IR. An approach to *knowledge-based IR* which aims at making use of the actual user's own cognitive capacities, intuition, and intelligence during retrieval of information. User and request model building, as well as inferential techniques, are basically applied in order to provide conceptual and retrieval support to the actual user (p. 164–171).

System objects. The items of a structured conceptual nature stored in an *IR system*. Two basic types of system objects exist: representations of contents of text or pictures generated by means of interpretation and indexing through application of relevant rules or algorithms in the *system setting*; the entire texts, pictures, or other conceptual manifestations of *information of potential value* to individuals (p. 16–17).

System setting. Structures implemented in *IR systems* representing the systems designers' conceptions of how to process the *system objects*, e.g. IR techniques, indexing rules, database structures, selection policy, etc. (16–17, 136–138).

User aboutness (or user-related aboutness). That *indexer aboutness* which attempts to tailor representations of documents, texts, images, etc. to known pre-suppositions of the users in domain(s). User aboutness implies providing points of contact from the known to the desired information, e.g. by the use of a different indexing vocabulary for each of several different potential user groups, also taking into account the potential use of *information* presented in each item (p. 52).

User interface. The functionalities of an *intermediary* (mechanism) directed towards the user of an *IR system*, e.g. user and request model building and analysis, explanation facilities, interrogation devices, etc. If no intermediary (mechanism) participates in the *IR interaction* processes, the user interface consists only of the 'display' and interrogation (command) facilities provided by the IR system(s) (p. 222).

Work space (individual). The individual's *cognitive structures* associated with external work domains, work tasks, and information systems, activity, goals, preferences and interests related to domains, information seeking behaviour, problem solving, decision making, and actual *state of knowledge*. The work space forms part of the individual's *cognitive model* (p. 131–133).

References are entered after first author or editor. Common abbreviations are used for the following bodies, journals and annual periodicals:

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 ARIST: Annual Review of Information Science and Technology. White Plains, NY: Knowledge Industry Publishers.
 ASIS Proc.: American Society for Information Science, Annual Meeting Proceeding.
 IRFIS: International Research Forum for Information Science (1977–1985).
 JASIS: Journal of American Society for Information Science.
 Journ. of Doc: Journal of Documentation.

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