Mortimer Taube and his legacy: between technical and scientific production

Mortimer Taube e seu legado: entre produção técnica e científica

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Abstract

This article deals with the life and work of Mortimer Taube, an American philosopher and librarian who contributed to the organization and representation of information and knowledge, and to the retrieval of information. Even if Taube does not identify yourself as a librarian, philosopher, documentalist or information scientist, your technical and scientific production brings him closer to the notion of Information that is currently studied by Information Science, Therefore, this article aims to study his work from this perspective. This is because Taube was the creator of the Uniterm System, a pioneer in post-coordinated indexing. He was the founder of Documentation Incorporated, a company that provided information services to renowned institutions such as the National Aeronautics and Space Administration and the United States Air Force. It was a qualitative, exploratory, bibliography and documentation study, without chronological limit, and the sources used were: Association for Information Science and Technology; Columbia University; Duke University; Library of Congress; Journal Storage; NASA's Library; University of Chicago Press Journal, and Library Quarterly. Were analyzed 52 documents, the oldest publication dates from 1936 and, the most current, from 1965. It is concluded that Taube's legacy was the contribution in the area of indexing and information retrieval, as well as his critical position on librarianship and information science. In general, the philosophical influence of Taube's education was reflected in his bibliographic production, spread among the formulation of concepts, theoretical foundations, and perspectives disseminated by the author.

Keywords: Epistemology of Information Science. Indexing. Information Retrieval. Mortimer Taube. Uniterm System.

Resumo

Este artigo trata da vida e obra de Mortimer Taube, um filósofo e bibliotecário americano que contribuiu para a organização e representação da informação e do conhecimento, e para a recuperação da informação. Mesmo que Taube não se identifica como bibliotecário, filósofo, documentalista ou cientista da informação, sua produção técnica e científica o aproxima da noção de Informação que é atualmente estudada pela Ciência da Informação, portanto este artigo tem

como objetivo estudar sua obra sob essa perspectiva. Isso porque Taube foi o criador do Sistema Unitermo, pioneiro na indexação pós-coordenada. Foi o fundador da Documentation Incorporated, empresa que prestava serviços de informação para renomadas instituições como a National Aeronautics and Space Administration (NASA) e a United States Air Force. O estudo é qualitativo, exploratório, bibliográfico e documental, sem limite cronológico, e as fontes utilizadas foram: Association for Information Science and Technology; Columbia University; Duke University; Library of Congress; Journal Storage; NASA's Library; University of Chicago Press Journal e Library Quarterly. Foram analisados 52 documentos, sendo a publicação mais antiga data de 1936 e a mais atual de 1965. Conclui-se que Taube deixou como legado sua contribuição na área de indexação e recuperação da informação, bem como sua posição crítica sobre biblioteconomia e ciência da informação. De modo geral, a influência filosófica da formação de Taube refletiu-se em sua produção bibliográfica, difundida entre a formulação de conceitos, fundamentação teórica e perspectivas divulgadas pelo autor.

Palavras-chave: *Mortimer Taube. Epistemologia da Ciência da Informação. Sistema Unitermo. Indexação. Recuperação da Informação.*

Introduction

This article deals with the life and work of Mortimer Taube, a philosopher and librarian who worked around the 1950s in the United States of America (USA) who made considerable contributions to librarianship and information science[2]. In this sense, given the relationship between librarianship, documentation, and information science, the existence of a company providing information services in the North American context of the Cold War, chaired by a librarian, is an opportune starting point to delve deeper into Taube's story.

Furthermore, it is pertinent to say that Taube's work at *Documentation Incorporated* aimed at organizing and retrieving information, which was a fundamental aspect of the historical and epistemological constitution of Library and Information Science (LIS), relating the computer technologies of his time to the practice of knowledge organization and information retrieval.

Therefore, even if Taube does not identify yourself as a librarian, philosopher, documentalist or information scientist, your technical and scientific production brings him closer to the notion of Information that is currently studied by Information Science. Therefore, it is believed that Mortimer Taube can be analyzed from this perspective.

Methodological Procedures

The research based this work on doctoral thesis, developed over the years 2019 and 2021, in the postgraduate program in information science at the *Universidade Federal de Santa Catarina*, where a survey was carried out on life and work by Mortimer Taube. Was a qualitative, exploratory, bibliography and documentation study, without chronological limit. The sources used to collect the data for this article were the bibliographic and documentary collections of the following institutions: Association for Information Science and Technology; Columbia University; Duke University; Library of Congress; Journal Storage; NASA's Library; University of Chicago Press Journal, and Library Quarterly.

From the universe of 124 documents, 52 were authored by Taube or published under responsibility of Documentation Incorporated. The metadata of these materials indicates that the oldest publication dates from 1936 and, the most current, from 1965.

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[2] It is important to say that Taube's work and legacy are disputed by the areas of Library Science, Documentation, and then by Information Science, and such discussion is not the objective of this research. This article presents a perspective that brings him closer to what is currently known as Information Science, through its professional performance, which was confirmed by studies by Vieira (2021). Available at: https://bu.ufsc.br/teses/PCIN0250-T.pdf. Access at: Dec. 22, 2023.

To present and discuss Taube's technical and scientific production, the chronological organization of his publications is interesting. This is because that organization allows the reader to follow the influences of his professional activity during his bibliographical and documental production. Thus, it is necessary to go back to the beginning of his work.

Results and discussion

In 1937, after graduating in library science at the University of California, Mortimer Taube's publications focused on librarianship, since, until then, due to his philosophy degree, his publications were based on philosophical and theoretical discussions. Without no information on his institutional ties, Taube was co-author of the article "A non-expansive classification system: an introduction to period classification", in The Library Quarterly Journal, written by John J. Lund.

In summary, the article alerts to the fact that the existing classifications corresponded to the organizational form of the time in which they were created, which, over the years, would leave these systems outdated in face of the new needs of each era. Also, from a historical approach, Lund and Taube (1937) argued that the 19th century was seen as the era of "progress" and that it resulted in the outbreak of the World War. Therefore, because it was a period of social resignifications, classification systems should keep up with these changes.

In the LIS's discussions, what is interesting in this article is the passage where the authors point out that classification would be one of the cornerstones of librarianship, which reaffirms a stance present in librarians of the time. In this sense, six principles present in one way or another, are listed in the construction of classification systems: (1) the system needs to show the relationship between terms and not just group similar things together and separate the different; (2) the system should be comprehensive, considering past, present and future; (3) the characteristics chosen should serve the purposes of the classification; (4) the terms need a consistent meaning; (5) the notation should fit the classification, not the other way around, and; (6) the notation needs to be economical, i.e. not too extensive (Lund; Taube, 1937).

Consistent with their historical perspective, the authors suggested a classification system in which the classes were based on historical periods. This division, in addition to maintaining the six characteristics presented above, could serve as a way to ensure that the systems would update and keep up with the 'progress' of each period.

The suggested classification presented by Lund and Taube in 1937, maybe is little sense compared to the great systems such as Dewey's Decimal Classification of 1876 and the Universal Decimal Classification of 1904/1907. However, when the authors propose the creation of classes based on historical periods and, within these classes, subclasses consistent with the knowledge of each era, it is possible to identify a shy concern with information retrieval.

The ethics' discussion, metaphysics, and philosophy are issues that, throughout time, are pointed out and discussed uniquely, so, for this reason, there is this concern that the classes and subclasses were not as rigid as in the classification systems most used in librarianship. In other words, it is necessary to have control over vocabulary and a certain classification protocol, but, furthermore, it is necessary to allow the classes to be expanded and adapted according to the informational needs of their time.

Taube turned specifically to the discussion of LIS, as we understand it today, beginning in the 1940s. It should be remembered that it was during this same period that Taube began working at Duke University Library, which may have influenced his bibliographic output. This is because the

article "Libraries and Research" discussed some aspects of the collections in university libraries and warned that these institutions were becoming simple "deposits" for materials.

From a pragmatic perspective, Taube proposes eight suggestions/thoughts that could contribute to the solution of this problem.

> 1. A university library is primarily a service institution devoted to the furtherance of teaching and research. It is not a museum for the storage or exhibition of literary monuments and curiosa.
>
> 2. Libraries should resolve to eliminate scarcity as a measure of the value of a book. In general, it can be said that the value of the contents of a book varies inversely with its scarcity. If due to a historical accident, a really valuable book should be scarce, its value will, in most cases, lead to reprinting.
>
> 3. In general, the most recent edition of a book is preferable to an earlier edition even if the earlier edition should be the first
>
> 4. Autographs and association features, whatever monetary value may accrue to books from them, are not germane to the concerns of a university library except in cases where the occurrence of an autograph is an important historical fact, not previously noted.
>
> 5. Libraries employing concerted action, should force down the prices on America. [...] If necessary, libraries should declare a moratorium on the purchase of such material.
>
> 6. Books whose value and importance are derived solely from the fact that they were published at a certain time and place [...] likewise have no value for a university library once the fact of publication is known and recorded. They should be discarded or sent to a museum or some other type of repository.
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> 7. Manuscript collections are usually considered the most important research materials, but the publication of the contents of a manuscript reduces the manuscript to a collector's item and dissipates its value for a research library. No library should collect manuscripts already exploited or edited by scholars unless there is good reason to believe that the editing has been badly done and needs to be done over.
>
> 8. I wish finally to present a plan that will help to solve the problem of a librarian who must decide whether or not to purchase a manuscript, a rare pamphlet, a first edition, or similar materials (Taube, 1940, p. 24-25).

Among Taube's suggestions, we must highlight number five, where the author argues that it is necessary to pressure America to lower the price of books. The curious thing about this proposal is the suggestion to unite in favor of lowering the price of books at the macro level, in America. Even more curious is the suggestion that libraries impose a moratorium, meaning they postpone the payment deadline to put pressure on the publishing market. With this, we see a strategic Mortimer Taube, who thinks about the articulation of different spheres (political, economic, social, and educational) to solve an issue that would perhaps remain only within the four walls of the acquisition sector of university libraries.

The next year, in 1941, Taube published "The Theory of Book Selection", where he presented criteria for selecting materials, focusing on documental value. With a speech similar to that of the previous text, the author stated that the theory of book selection is a branch of the general theory of value (Taube, 1941). 'Value theory', in this case, approaches morality and encompasses axiology, dialoguing with normative ethics, where there is interest in discussing questions about the nature of value and its relation to other moral categories (Schroeder, 2021).

In Taube's conception, book selection can be divided into descriptive and normative aspects. The first concerns selection based on the work's practical usefulness, and the decision-making that chooses one book over another. The normative aspect, otherwise, involves what underlies the descriptive decisions, the purpose of reading, education, and the library itself in its institutional context (Taube, 1941).

By analyzing the "Proceedings of the Conference on Library Specialization" held in New York, it can be seen that Taube presented a text where he problematizes the reality of special libraries. In it, he exposed the need for cooperative work among such institutions, especially concerning the cataloging process, and concluded that the greatest difficulty is convincing librarians to do this collaborative work. Not because the professionals lacked the skills to do so, but because the 'climate' of the Conference indicated that librarians were not updating their profession (Taube, 1942).

With the end of World War II in November of 1944, Mortimer Taube published an article about a collection of 'war agencies' at the Library of Congress, where he started working that same year. In this division, part of the materials were pamphlets issued by the Deutsche Informationstelle, the German Information Office, published in several languages, and distributed in other countries or by official vehicles and independent publishers that, according to the author, disguised the origin of the content of these publications.

Taube's position was that these titles were consciously manipulated to enable the publication of these works that originated in Germany. The author verified that it was never mentioned that they were faithful translations of the originals and complemented this by explaining that "it is in keeping with other aspects of Naziism that its publishing activity presents a record of deceit and double-dealing without parallel in publishing history" (Taube, 1944, p. 90).

In 1948, as a member of the Library of Congress's Science and Technology Project, and as part of work done for the Office of Naval Research, Taube published "The planning and preparation of the Technical Information Pilot and its cumulative index". This article was based on research and partial results involving the pilot project of a cumulative index.

In this case, the model for the cumulative index prototype sought to compare and unite the *Library of Congress* catalog laid out on 3x5-inch cards, and the Monthly Checklist, with 4x6-inch diagrammed cards (Taube, 1948). Another important information is that this project was restricted to technical information, a necessity for government agencies involved in scientific and technological research and development at the time. Therefore, the cumulative index also became known as the Technical Information Pilot (TIP) (Taube, 1948).

In 1948, Taube attended the Royal Society Scientific Information Conference, and in 1949 he joined the Atomic Energy Comission (AEC). He published the article "New tools for the control and use research materials" that year, in the Proceedings of the American Philosophical Society, and in 1950, in The Library Quarterly, he published "The cataloging of publications of corporate authors". In 1947, the average time to perform descriptive cataloging was two hours and twenty minutes per title. To optimize the process of storing and retrieving information while maintaining control, the Library of Congress Science and Technology Project conducted research into the new design and indexing and classification techniques applied to existing machines. This took place in partnership with the Office of Naval Research, through the encouragement of Dr. Frederick Wagman and Ms. Lucille Morsch (Taube, 1949, 1950).

Based on these studies, it was shown that the card catalog was the best option to keep an updated record. However, with the increase in bibliographic production, the maintenance of this catalog became more expensive and the technologies that emerged at that time became

remarkable compared to the traditional catalogs. Therefore, there was a proposal to automate the search from the card catalog.

> We propose to feed our cards onto a moving belt. A photoelectric cell will open a shutter when the part of the card to be copied interrupts a beam of light. The card will then be photographed or scanned line by line by a flying spot scanner from a kinescope. Another signal will close the shutter at the end of the text to be copied. At the other end of the machine, the text read from the cards will be projected on a film ready to use in preparing a plate for photo-offset reproduction. A machine of this type can prepare a page copy by selecting any number of lines from pre-existing copy (Taube, 1949, p. 250).

The description of an automated information retrieval system using IBM's punched cards resembles the Uniterm System retrieval proposal.

Another issue addressed by Taube (1950) concerns the difficulty of devising entries for corporate entities. After all, under the impact of the World Wars, the adoption of entries such as 'USA', 'Soviet Union', and 'Germany' that worked well in the mid-1910s (Taube, 1950), would not contribute to the catalogs and systems of 1950. This was because these types of documents became recurrent, and entries in this way could impair information retrieval because they did not reflect the complexity of the collection.

Thus, Taube summarized how cataloging based on the rules created for the entry of corporate authorities proposed by the Project solved the problems listed in the article:

> 1. Cataloging will be faster because a considerable portion of the research, beyond the book in hand and the record of material already cataloged, is eliminated.
>
> 2. Research beyond the book in hand and the record of material previously cataloged does not contribute materially to the achievement of consistent entries and does introduce into the cataloging process extraneous considerations relating to administrative history, law, financial structure, etc., which have no bibliographical significance for the users of the catalog.
>
> 3. The number of necessary rules has been reduced from over a hundred, plus many more exceptions, to three rules with no exceptions.
>
> 4. Under (1) and (3), the cost of cataloging can be substantially reduced.
>
> 5. The elimination of exceptions and the multiplicity of conflicting rules results in a more consistent and logical catalog.
>
> 6. Any user of a catalog who wishes to spare a few minutes can learn our rules of entry for corporate bodies and thus find his way around any catalog constructed under these rules.
>
> 7. Similarly, catalogers can be trained in half a day to use our rules; thus, the cost of cataloging in terms of high professional salaries will be considerably reduced (Taube, 1950, p. 17-18).

As early as 1952, in the article "Possibilities for cooperative work in subject controls", published by American Documentation, Taube presented some examples of cooperative research activities between institutions that involved libraries. For the author, one of the most successful stories of cooperation between libraries occurred in a forced manner at the end of World War II, when the units began to develop research plans using the professionals involved in the information collection service, through the Cooperative Acquisitions Project (Taube, 1952a).

Documentation Incorporated was created in 1952, and Taube left the AEC to work on his company. In the same year, Taube published the article "Unit Terms in coordinate indexing" in

American Documentation, together with Documentation Incorporated employees Cloyd Dake Gull and Irma S. Wachtel.

The paper presented the disadvantages of using alphabetic terms and the advantages of using 'unit' terms or uniterms in the context of information retrieval. At the beginning of the paper, the authors pointed out that this was an experimental study, which was developed by Documentation Incorporated in six months, and partnership with Armed Services Technical Information Agency (ASTIA) (Taube; Gull; Wachtel, 1952).

The operation of the Uniterm System will be commented on below, but there is one sentence in this 1952 article that is worth highlighting: "It is true that indexing for machine searching implies coordinate indexing, but coordinate indexing does not imply indexing for machines" (Taube; Gull; Wachtel, 1952, p. 213). Thus, one can see that Documentation Incorporated's contribution to automated information retrieval and to the field of knowledge organization itself created the possibility of performing coordinated indexing by allowing the retrieval process to be carried out employing electronic machines.

There is another article by Taube published in 1952, also in American Documentation. The text "Special librarianship and documentation" defined what was considered special librarianship and suggested that documentation came from a natural movement, which required new ways of working with information (Taube, 1952b).

On coordinated indexing, Taube (1953a) stated that it was a general method that encompassed the specific method of the Uniterm System and identified that one of the goals of the studies was to verify what kind of change would be necessary to maintain the effectiveness of the system when it was performed by machines. About this, the machines related to the Uniterm System were the IBM-produced Rapid Selector, Univac, and Eniac. According to Taube, these machines enabled elaborate addition, which could react to magnetic pulse punched cards quickly and were used to test the Uniterm System (Taube, 1953a).

According to Gull,

> The new machines are commonly thought to offer a solution to the problem of subject control; while they could be used for searching author and title entries, they are not being used experimentally for such searches now. [...] If these machines are viewed as opening up the possible achievement of a universal catalog, a little arithmetic soon reveals that one search of a universal catalog with any of the machines will still require many hours or many days (Gull, 1953, p. 81).

In this sense, the author understood the electronic machines as an instrument that could optimize work, but not as an instrument that would enable the realization of the universal catalog ideal. This is because there is the understanding that the volume of information would tend to grow and, even with all the speed achieved, to believe in the centralized search for information on a worldwide level was something unfeasible.

Taube and Irma S. Wachtel published a technical report entitled "The logical structure of coordinate indexing" by American Documentation journal, also in 1953. This technical report, prepared under ASTIA contract number AF18(600)-376, dealt with the logical structure of coordinate indexing, which, according to Taube and Wachtel (1953), was based on Boole's and Schröder's algebraic logic.

That same year, Taube published a review of Henry Evely Bliss's "A Bibliographic Classification, Extended by Systematic Auxiliary Schedules for Composite Specification and Notation". This librarian, who showed interest in creating a general classification system for libraries in 1910, is

a reference for the field of knowledge organization to this day. In the review, Taube exposes his uncomfortable position by criticizing the work of Bliss that, for him, with Shera, had an important role in bibliographic classification (Taube, 1953b).

In his book, Bliss presented three classification systems: semantic, topic (also called cross-classification), and taxonomy. For Taube (1953b), semantic subordination and cross-classification were the most widely used within the universal classification systems, which led him to criticize librarians for working based on duality rather than seeking to unite theories and knowledge from other fields, such as mathematics and logic.

In 1954, Documentation Incorporated published another technical report, prepared under contract Nonr 1305(00) with the Office of Naval Research, entitled "The mechanization of coordinate indexing". This report brought information on ASTIA's contracting of the company to experiment with a new information retrieval system, the Uniterm System. According to the document, the Uniterm System was promising in that it could retrieve information efficiently, without losing the specificity of searches, at low cost, and with high potential to fulfill this proposal. In addition, the report stated that some data retrieval machines had designs combined with the System's logic, to make this mechanization feasible. This combination occurred because the systems that "monopolized" the information field at the time, IBM and Remington Rand, were great at data tabulation, but were not specific to mechanized information retrieval (Documentation Incorporated, 1954).

The following year, Taube published "Storage and retrieval of information through the association of ideas" with theoretical solutions to the problems identified in 1954, *i.e.*, the association of ideas in mechanized information retrieval systems. This is because, for the author, when retrieving information, it is important to retrieve not only documents from the way they were indexed but also documents that are associated with each other from the initial search (Taube, 1955).

With this, Taube (1955) created the expectation that he would be able to develop a unified method of association searching, which didn't happen. This is because, when Taube studied association logic, he discovered that association searching was a search for 'ideas', associating the information with meaning, and not just for documents. And, thus, he understood that what machines commonly did was document search.

From 1960 on, Taube's approach to machine translation studies became more intense. Taube published a comment in the "American Association for the Advancement of Science", on the topic of Computers and game-playing. In this commentary, Taube criticized Nobert Wiener's position published in Science magazine, as he felt that Wiener simplified the machine learning process. In Taube's (1960) words, the fact that the author concurrently discussed machines that play chess and learning machines could cause the reader to misinterpret the latter. This is because it could suggest that such machines, like chess machines, are faithful to physical realities without pointing out that they work from a conditioned simulation. Therefore, the false understanding caused by simplifying the machine learning process would hinder the advancement of studies in this field.

In 1961, Taube was invited by Lester Eugene Asheim, dean of GLS, to draft a paper on developing documentation and information retrieval from a theoretical perspective. The paper, titled "Documentation, information retrieval, and other new techniques" was published in The Library Quarterly, a journal associated with the University of Chicago.

In the article, Taube related library science and documentation and briefly commented on a course he had taught at GLS in 1952. On this occasion, Taube explains that he had to adopt the term 'documentation' instead of 'advanced cataloging'. According to him, this allowed him to reach more

students who would not have been attracted by the nomenclature initially defined (Taube 1961). Theoretically, he signaled that his understanding of 'information' is close to the physicalist current in Shannon and Weaver's (1964) terms and commented on the positioning of librarians in terms of documentation and information retrieval.

"A note on evaluating the WRU Semantic Code as an Example of Generic Coding" was published in 1962 by American Documentation. In this article, Taube presented an analysis of the semantic code developed by Western Reserve University. According to the author (Taube, 1962), the literature on information retrieval was undergoing a period of comparisons and evaluations of different systems to help choose the most appropriate method for the reality of each library.

In "Experiments with the IBM-9900 and the discussion of an improved COMAC as suggested by these experiments", published in 1962 in the Journal of Chemical Documentation, Taube presented a study that focused on information retrieval systems based on the logical comparison, rather than arithmetic. The objective was to present some considerations about the machine that resulted in the COMAC project, and the description of the IBM 9900 model that was reduced to the system proposal, to develop an efficient and low- cost device. One of the points of analysis was the expandability of the systems. According to the author, the Hollerith encoding used in the IBM 9900 limited the card to a set of twelve numbers with six digits each, while COMAC, which in this case also had limitations, demonstrated better performance in this same activity of storing and retrieving information (Taube, 1962).

In 1963, Taube presented some guidelines for the development of a relational system with cross-references focusing on the creation of thesauri for mechanized systems, in the article "Extensive relations as the necessary condition for the significance of 'Thesauri' for mechanized indexing". In this sense, it should be said that the Uniterm System has been related to the development of thesauri over time (Lancaster, 1986; Moreira; Alvarenga; Oliveira, 2004) and, in this context, Taube presents the ASTIA initiatives developed in the project 'ASTIA Subject Headings', which, as a product, created the 'Thesaurus of ASTIA descriptors'.

About Documentation Incorporated, Taube (1963) pointed out that the Group of the du Pont Engineering Department built a thesaurus based on the association of terms proposed by the company. This thesaurus, published by the American Institute of Chemical Engineers, assisted in understanding the relationship between terms from mechanized systems.

In 1964, in partnership with Vladimir Slamecka, from the Georgia Institute of Technology, Taube published the text "Theoretical principles of information organization in librarianship", where they stated that librarianship had lost its opportunity for growth through documentation. In this article, the authors considered librarianship as a service, whose purpose would be the mediation of knowledge to facilitate communication between individuals and societies, and not the creation of new knowledge (Slamecka; Taube, 1964).

Once they identified the organization of information as the core field of librarianship, the authors presented an outline of what would be a minimum syllabus, which would contemplate the disciplinary field of information organization, considering the practical and technological advances of the time. The proposal was divided into six major divisions that cover general issues in librarianship, as follows: (1) The concept of organization as a result of service; (2) The concept of information in librarianship; (3) The concept of formal relationships; (4) The organization of materials and information; (5) Topological and intellectual relationships between information classes and (6) The role of the library profession (Slamecka; Taube, 1964).

The first three fields deal with conceptual notions. In the first, the concept of organization is treated based on: organization and access; knowledge, physical materials, and information; change of organization objects in the library service; and bibliographic organization. The concept of information, on the second topic, brings together: information as the object of study of several disciplines; and attributes of information as restrictions (intellectual and topological) to its organization. The third item, on the concepts of formal relations, concerns: order, consistency, and formality; class algebra and truth functions; modern machines (principles of operation); topological organization and manipulation of classes in the machine (such as encoding, file organization, classification, and matching); and machine language through algorithms and programming (Slamecka; Taube, 1964).

For Slamecka and Taube (1964), the organization of materials in item four follows a historical perspective and features: a symbolic representation of materials and information; organization of physical materials (such as books and microfilm); and the organization of access tools (catalogs, subject lists, bibliographies, indexes, thesaurus). Topological and intellectual relations become closer to the new solutions: basic concepts and methodology; formal criteria for subject analysis such as the limitations of human and machine applications; formal criteria for deriving applications of conceptual relations in cataloging, searching, indexing, and retrieval; and the concept of information organization systems (function, products, and techniques). Finally, the librarian profession discusses the formalization and evaluation of the professional.

As early as 1965, Taube published "A note on the Pseudo-Mathematics of relevance", in American Documentation. In this article, Taube comments that there is a trend in the scientific literature of the time to understand that the quality of document retrieval systems is measured based on the percentage of relevance that each system provides. For Taube, this means of evaluation couldn't be considered a doctrine in the field, because probability indicated that if the number of documents tested was large, there would be a high chance of retrieving irrelevant documents, and if, in the opposite case, the amount was too small, relevant documents would not be retrieved. With this, Taube drew attention to the results of the Cranfield Project, which began in 1957, and recognized the difficulty of accurately measuring relevance in different systems (Taube, 1965).

The above shows that Taube was an incisor professional who argued and defended his concepts and did not turn away when other researchers criticized his work or positioned themselves in opposition to his perspectives. His scientific production was also marked by interdisciplinarity, just like Taube's work.

His involvement with people from different fields, whether in Documentation Incorporated or in other places where he carried out his work, such as the AEC, brought him an awareness of research trends related to the advancement of electronics, computing, and linguistics, which influenced his production adding to his knowledge of librarianship, documentation, and philosophy. Therefore, based on the diversity of authors who published with Taube and the multiple theoretical and practical relationships of his production, it is possible to say that his construction for LIS was interdisciplinary. After all, Taube acted and published along the same lines as his argument: that professionals from various fields of knowledge should work and share theories and techniques about the phenomenon of information, as one big family.

In this sense, it should be noted that Taube moved between technical and scientific production, conversing with blue-collar professionals and large institutions such as NASA, AEC, and IBM, or important theoreticians such as Shera, Bliss, Shannon, and Weaver. Therefore, Taube managed to relate theory and practice from a coherent and easy-to-communicate narrative, and

this is what made him a unique character in the epistemological discussion of LIS, or the theoretical and applied discussion of knowledge organization and information retrieval.

Considerations of Taube's legacy

This text enabled the presentation of some aspects of the life and work of Mortimer Taube, a librarian, and philosopher who developed the Uniterm System, a method of post- coordinated indexing that potentiated librarianship to information and communication technology. He was also entrepreneurial in starting *Documentation Incorporated*, a company focused on information organization and retrieval. Taube was bold at many points of his career, and it was his courage that made him stand out among the great names in librarianship and knowledge organization.

Taube worked during the so-called 'golden age' of the Cold War, when both the USA and the USSR advanced in scientific and technological research, development, and funding. This enabled his company to benefit from funding from government initiatives. In this sense, his company and his product, the Uniterm System, were tested in important projects for the advancement of information retrieval, such as Project ECHO and Project Cranfield.

Taube defends mechanical and automated progress, and suggests a system aimed at this mechanization but doesn't believe in the 'deification' of the artificial. So, it is possible to draw a parallel between Taube's reflections and the actuality, where discussions about the semantic web and artificial intelligence are present in Information Science.

In general, the philosophical influence of Taube's education was reflected in his bibliographic production, spread among the formulation of concepts, theoretical foundations, and perspectives disseminated by the author. The analyzed bibliography shows five theses defended by Taube: (1) Librarianship is a practical and professional activity, and shouldn't be judged with less prestige because of that; (2) the techniques of documentation come to the USA to meet society's informational demands; (3) there is the need for something that encompasses these techniques and disciplines in a single-family, the family of information; (4) science is subject to errors and criticism, and shouldn't be devalued because of that; (5) machines can't think because the human language will never be understood by the machine as such, only as a code or an artificial language.

This shows that Taube's legacy to the knowledge organization goes beyond the Uniterm System. Taube was bold, an entrepreneur, innovative, and a thinker who managed to promote a dialogue between theory and practice, articulating the philosophical and epistemological basis of the field with the applied needs of librarianship and information science.

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Collaborators

K. Vieira and C. Karpinski contributed to conception and design of the study. K. Vieira organized and analyzed the data and wrote the first draft of the manuscript. All authors contributed to manuscript revision, read, and approved the submitted version.