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Verbal protocols in Brazilian Information Science: a perspective from indexing studies

Abstract
Verbal protocols have unlimited applicability as an introspective technique for collecting qualitative data from scientific research in information science. Protocol analysis of verbal thought reports is frequently used in different knowledge fields, essentially as it enables observation of the phases in subjects’ cognitive processing through verbalizations made during reading activities. As a way of increasing knowledge about the verbal protocol as a methodological resource in information science, different modalities of the technique were applied to Brazilian research. It was verified that research conducted by verbal protocol is, for the most part, aimed at representing thematic information, focusing particularly on inquiries that involve document reading and professional practice of indexing processes and subject cataloging in a university library. Although such research areas are the focus of the present study, the introspective nature of the verbal protocol method favors further research into other issues, especially in the area of knowledge organization and representation.

1. Introduction
The cognitive revolution of the 1960s stimulated scientists’ interest in knowledge about how thinking allows subjects to generate solutions to perform new procedures, that is, apply previously acquired knowledge to solve new problems. This context of enthusiastic technological innovation contributed to the resumption of introspection in psychology, until then discredited as a scientific method. Introspection techniques are classified into three groups: self-observation, in which research subjects report their own mental events – that is, introspection whereby subjects observe and analyze their behavior; self-report or self-perception, in which subjects verbalize their experience to the researcher – that is, retrospection; and “High Thinking”, a method put forward whereby research subjects think aloud while performing a certain activity – a technique known as verbal protocol or protocol analysis (Radford and Burton 1974).

Based on the introspection method, Anders Ericsson and Herbert Alexander Simon, researchers in the field of experimental cognitive psychology, indicated in the 1980s that subjects’ cognitive processes can be described as sequences of served and structured information. To do so, they recommend the use of protocol analysis of verbal reports of thought sequence, also known as records of verbal reports or verbal protocols, whereby observations of the cognitive process provide information about the phases of individual processing, that is, the successive states of information verbalized by the subject while accomplishing a given task.

Used as an introspective method of data collection, verbal protocols have been shown to be a valuable means of observing conscious mental processes, and are the
main data source for cognitive research, being used in different areas of knowledge since they enable observation of the subject’s cognitive processing phases by means of thought verbalizations. A growing amount of scientific research into verbal protocols has been conducted since 1975 in areas such as psychology, education, medicine, computer science, ergonomics, information science and librarianship, nursing, and gerontology, among others (Alonso-Arroyo, Fujita, Gil Leiva and Pandiella 2016).

Observations of mental processes provide important information about individual processing steps while subjects exteriorize their mental processes during an activity and maintain the sequence of processed information. Therefore, “High Thinking” or the subject’s Thinking Aloud while performing a task is recorded and transcribed verbatim, producing verbal protocols, that is, verbal reports of the conscious mental processes of the research subject (Cavalcanti and Zanotto 1994).

As a methodological resource, verbal protocols can be applied in three modalities. Using the Individual Verbal Protocol, the researcher intervenes with a single objective, to remind the participant subject about the importance of “High Thinking” in the execution of an activity, without performing any other types of interference or comment. On the other hand, the Interactive Verbal Protocol involves the active participation of the experienced researcher who, by motivating the subject during the activity, contributes to the achievement of more satisfactory levels of understanding. This interactive and innovative verbal protocol format was proposed by Nardi (1999) when demonstrating the possibility of interaction in protocols within the area of applied linguistics. In turn, the Group Verbal Protocol, another modality derived from the above-mentioned author’s research, arose from adaptations in the technique to investigate the opinion of a certain group of subjects on a specific theme, focusing on socially constructed cognition. The conduct and effectiveness of verbal protocol modalities depends, to a large extent, on the researcher’s position at the time of their application. According to Nardi (1999), the type of researcher participation can be divided into: passive participation (does not interact with the other participants, being a simple observer); moderate participation (alternating between observer and active participant roles); active participation (seeks to do what other participants do); and full participation (one of the participants themselves who decides to analyze the group data).

The complexity that permeates professional practices in information science and librarianship demands special attention to cognitive strategies, and protocol analysis of verbal thought reports is a timely alternative for uncovering subjects’ conscious experience in information processing. In Brazil, this choice of technique as an option for data collection and pedagogical resource in undergraduate education and continuing education has a significant presence in research into the study and observation of document reading processes in indexing and indexers’ professional practice.

To broaden knowledge about verbal protocols as a research resource in information
2. Research into subject indexing with verbal protocols

In the context of Brazilian information science, verbal protocols are most frequently applied in research aimed at observing reading processes. Research which applies the individual verbal protocol is directed to the observation of reading strategies used by indexers and subject catalogers during the representation process of document information. According to Fujita, Nardi and Fagundes (2003a), reading is a basic activity of document analysis, which is linked more directly to indexing objectives, that is, a professional reading that encompasses cognitive and metacognitive strategies, the use of the introspective technique of the verbal protocol thus being an effective way of finding out indexers’ individual processing. In the authors’ view, the verbal protocol “... provides direct access to the reading mental process while being carried out by the reader, unlike the ones that reveal only reflection after the reading process” (Fujita, Nardi and Fagundes, 2003b).

Accordingly, Fujita (2009) carried out a study which analyzed a socio-cognitive context to verify the perception of subject catalogers and university library users regarding book indexing, exposing the distance that exists between the literature that has been produced and the professional practice of librarians in this environment. In another instance, the idea was proposed to investigate the document reading of subject catalogers for book indexing, whereby the technique was applied to subjects from a sample of nine university libraries, leading to the document reading model being adapted for book indexing as a quality tool for representing concepts during subject analysis (Fujita 2013).

As a way of contributing to research on document languages, Boccato (2009) applied verbal protocols among catalogers, librarians and first and final year students of Civil Engineering, Pedagogy and Dentistry courses at São Paulo State University, with the purpose of verifying the process followed in the activities of indexing and conducting a bibliographic search in the online collective catalog of the institution’s Library Network.

Sousa (2012) studied the thematic representation of books that takes place during the process of subject analysis in the cataloging of subject matter for production of document information in the library catalogs of the Federal Institutes of Education, Science and Technology through a study which observed cataloging librarians. Reis (2012) used the technique to understand and analyze catalogers’ document reading and thus analyze textual structure in the subject cataloging of books, by observing the
expertise they have acquired from the profession, within the specific domain of university libraries. To contribute to the professional functioning of classification as an interpretative process, focusing on document subjects and covering users’ needs within the academic community, Sousa and Fujita (2013) considered catalogers’ perceptions in order to investigate the thematic description of book documents from the perspective of the bibliographic classification process. According to Redigolo (2014), the technique revealed the catalogers’ cognition about the subject analysis of books in Brazilian and Spanish university libraries, which favored a comparative analysis between these two realities and the elaboration of guidelines to develop the subject analysis in this informational context.

Tartarotti (2014) used the method to collect data from librarians at the University of São Paulo working on information retrieval systems in specialized scientific areas of health for comparative observation of the cognitive processes of document analysis, of the subject thesis cataloging in online collective catalog Dedalus and the indexing process in the Lilacs database. In Silva and Boccato (2012), the application of modality with interaction and the researchers’ moderate intervention aimed to evaluate the use of university libraries’ online collective catalogs in the information retrieval interface and in the users’ socio-cognitive context. The study by Andrade (2014) is one of the few carried out in the archival environment, whose use of the modality made it possible to analyze users’ information search strategies from the Judiciary Section of the Federal Trial Court of Paraíba State (JFPB).

Regarding interactive verbal protocols, this modality has been applied more in the teaching of subjects such as indexing and document reading in undergraduate courses in librarianship. The results of this didactic option have been presented through some scientific papers, such as the study by Fujita, Redigolo and Dal'Evedove (2007) which set out to evaluate the use of this modality as a pedagogical resource in the teaching of indexing to indexer apprentices; Borba and Fujita (2005) and Borba (2006) analyzed the role of the experienced teacher in initial indexer training through the activity of document reading in the classroom with students studying librarianship at the Universidade Estadual Paulista, with a view to providing a methodological description of document reading in undergraduate courses and information systems; and more recently by Fujita (2009) who investigated, from the perspective of the interactive verbal protocol, the applicability of the document reading model for indexing scientific articles as a socio-cognitive teaching methodology for apprentices.

Group verbal protocols are applied fairly widely, and used frequently in areas such as document reading, indexing policy and document languages from a socio-cognitive perspective, as well as being a pedagogical resource in the classroom, an approach presented by Fujita and Rubi (2007).

Among the research conducted to date, there is Gonçalves (2008) who observed the socio-cognitive context of users who are members of research groups of the
Universidade Estadual Paulista. Librarian and users have also been the object of study, whose use of the modality served to observe the context of socio-cognitive indexing in university library book cataloging (Fujita 2009).

Boccato (2009) evaluated the use of document language in online collective university library catalogs by collecting data with leaders, reference librarians, cataloguing librarians, undergraduate students and leading teachers or research group members in order to obtain the participants’ social opinions on the performance of document languages in relation to the needs of thematic treatment and information retrieval. On the other hand, Martinho (2010) resorted to reading as a social event with theoreticians and professionals of the area to verify how the principles advocated by Cutter influenced the information representation processes, due to the imprecision in process definition and conceptualization of subject cataloging before the other processes of thematic information treatment.

In Dal'Evedove and Fujita (2012), the authors investigated the reality of the process of cataloging the subject in different university libraries from the perspective of the librarian, whose results led to further research into the subject cataloger’s professional knowledge regarding the role of indexing policy in the context of university libraries (Dal’Evedove and Fujita, 2013).

Dal'Evedove (2010) analyzed the daily actions of leading librarians, reference librarians and subject catalogers, based on the knowledge and process of thematic information treatment in the context of university libraries. In another situation, the group voice protocol helped in validating a set of index policy guidelines for university libraries (Dal’Evedove 2014). In addition, in the indexing policy area, the works of Rubi are highlighted (2004; 2008) which analyze the context of library indexing and professional knowledge about the indexing policy, resulting in an indexing policy proposal with philosophy and guidelines for accomplishing the indexing process in university library cataloging.

Fujita and Rubi (2006) used reading as a social event to obtain indexing policy subsidies through indexers’ organizational knowledge of university libraries; Rubi, Fujita and Boccato (2012) did likewise, with the aim of transforming the indexer’s tacit knowledge into explicit knowledge in the form of an indexing manual. In Kochani, Boccato and Rubi (2012) and Kochani (2014), the modality served to discuss and outline policy guidelines for clippings in automated systems of Social Communication Coordinators in Brazilian university environments.

3. Final considerations

The verbal protocol is a methodological resource widely used in Brazilian information science, especially to observe document reading and the professional practice of librarians in subject indexing activities. Indexing research using verbal protocols as a teaching and/or research technique presents consistent results.
It is observed that most of the research conducted with a verbal protocol is related to issues involving document reading and professional practice in the indexing and subject cataloging processes of a university library, since it enables observation of the phases in the subject’s cognitive processing through verbalizations made during reading activities. Indexing searches by applying individual verbal protocols are essentially based on observing reading strategies used by indexers and subject catalogers during the process of representing document information. Interactive verbal protocols are more developed in the teaching of subjects such as indexing and document reading in undergraduate courses in librarianship. The modality of group verbal protocol is used frequently in areas such as document reading, indexing policy and documenting languages from a socio-cognitive perspective, as well as a pedagogical resource in the classroom for the teaching of themes related to the analysis of textual structures and for identifying and selecting concepts of documental representation.

Despite the concentration of studies dedicated to the production of theoretical and methodological references to the process of document reading in subject indexing, the technique’s introspective nature favors further research into other surrounding issues, especially regarding knowledge organization bias. Due to the introspective nature of verbal protocols, their application is not limited to a specific axis, and they can contribute readily towards resolving other issues facing information professionals in multifaceted environments.

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