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Article

Epistemic Practices of Knowledge Organization: A Trio-Autoethnographic Analysis of Indexing an Encyclopedia of Library and Information Science

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Abstract

This study examines the epistemic practices underlying index construction for a comprehensive encyclopedia of library and information science published in Japan. Using trio autoethnography, the indexing coordinator and two indexers retrospectively analyzed their decision-making processes through Hjørland's four epistemological orientations: rationalism, empiricism, historicism, and pragmatism. Analysis of indexing episodes revealed that, while each orientation appeared in practice, pragmatic reasoning often proved decisive when orientations conflicted. Epistemic heterogeneity was the norm, with different forms of reasoning coexisting and shifting within individual decisions. Role differences also influenced epistemological orientations: the coordinator favored user-centered reasoning, while the indexers emphasized procedural consistency. The findings demonstrate that knowledge organization processes are inherently situated, pluralistic, and negotiated rather than governed by a single epistemological stance.

Keywords: autoethnography; back-of-the-book index; encyclopedia indexing; epistemic practices; pragmatism

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1. Introduction

Knowledge organization (KO) in specialized domains requires decisions that shape how knowledge is structured and accessed. Specialized encyclopedias exemplify this work by delineating a field's concepts and relationships. The back-of-the-book index is especially revealing: it represents a downstream crystallization of earlier editorial and authorial decisions. While the back-of-the-book index is produced at the final stage of encyclopedia making, it condenses judgments about scope, terminology, and relevance that have accumulated throughout the project.

This paper presents a case study of the construction of the subject index for the Encyclopedia of Library and Information Science (Japan Society of Library and Information Science, 2023), hereafter ELIS. KO theory suggests that indexing practices are shaped by epistemological orientations (Hjørland, 2024a), which can be observed in action through indexers' decision-making under practical constraints. Our approach is trio-autoethnography (Norris et al., 2016): the indexing coordinator and two indexers, also encyclopedia contributors, reflected on and analyzed their own work. This insider method reveals tacit reasoning shaped by subject knowledge, editorial policy, and anticipated user needs.

The goal of this study is to bridge the gap between KO theory and practice by empirically examining how epistemological orientations surface in collaborative indexing. While epistemology is widely discussed in KO research, little is known about how it manifests in real-world projects involving multiple practitioners under time and space constraints. By focusing on a concrete case of encyclopedia indexing, this study contributes empirical insight into an area that has remained underexplored.

In the following, we first review relevant literature on KO and indexing (Section 2). We then explain our methods, comprising an initial preliminary study and the main trio-autoethnography, including our analytical framework (Section 3). Next, we present the results (Section 4), detailing the types of reasoning the indexers employed, how these reasoning modes combined within episodes, and how the team's negotiations led to evolving indexing policies. We discuss the implications of these findings for KO theory and practice (Section 5), including consideration of an alternative analytic lens for future studies. Finally, we conclude with a summary (Section 6).

2. Literature Review

KO research has long emphasized that categorization and classification rest on epistemic foundations, because decisions about concepts and relations are inseparable from views of what counts as knowledge (Smiraglia, 2014). Hjørland's four epistemological orientations (rationalism, empiricism, historicism, and pragmatism) are widely recognized in KO scholarship (e.g., Machado et al., 2019) and provide a shared analytical vocabulary. Hjørland (2024a) explicitly argues that there is no theory-neutral view of indexing and that epistemological assumptions are always operative in practice. He wrote: "The field of epistemology covers a bewildering range of different theories and positions, but four of these are more fundamental and provide a very powerful way of analyzing theories of knowledge in general as well as single fields like indexing. All other theories of knowledge may be considered variants or combinations of one of these four positions: Rationalism, empiricism, historicism and pragmatism. This classification provides a systematic classification of theories of indexing" (p. 613). This formulation clarifies contrasts such as rule-driven consistency versus user-centered adequacy, while linking concrete indexing practices to broader social theories of knowledge (Hjørland, 2024b). We adopt these orientations as an orienting lens for analyzing concrete decision episodes in indexing work.

Hjørland (2014) also distinguishes "pragmatism" from "practicalism". Pragmatism, as an epistemological orientation, explicitly engages with values, social consequences, and long-term goals; it treats knowledge claims as answerable to communities and their interests. Practicalism, by contrast, denotes context-sensitive problem-solving aimed at workable outcomes without such explicit value articulation; the criterion is what works under the circumstances, rather than what is epistemically or ethically justified. This distinction is theoretically important because decisions that appear pragmatic on the surface may in fact reflect practicalist expediency. We return to this distinction in the Discussion and Conclusion, where we acknowledge that our retrospective data do not always allow us to determine which of the two is operative.

Back-of-the-book indexing can be understood as an epistemic practice in which symbols are assigned to enable users to navigate from known terms to unknown locations. Research on indexing foundations and practice has accumulated over several decades in both practitioner-oriented and scholarly literatures (e.g., Anderson and Pérez-Carballo, 2001a; 2001b; Fugmann, 1993; Lancaster, 1991). Within this literature, related work has examined whether the characteristics of back-of-the-book indexes vary depending on who produces them, showing differences between author-produced and non-author-produced indexes (Diodato and Gandt, 1991). This body of work is supported by extensive standards and guidelines that provide converging norms, notably International Organization for Standardization (ISO) 999, together with related thesaurus standards such as the ISO 25964 series and community-specific guidance issued by professional bodies and publishers. Manuals and dedicated venues, including handbooks and specialist journals such as The Indexer and Key Words, further supply detailed technique and craft knowledge (Mulvany, 2005; Ullstrom and Zafran, 2025). Such practitioner-oriented literature also includes descriptive accounts of back-of-the-book indexing practices in specific national contexts, including studies on the Netherlands (Bosschieter, 2006) and

China (Dai, 2008; Wang, 2009). In Japan, a domestic guideline for book indexing, SIST 13, was formerly issued as part of Standards for Information of Science and Technology (SIST), a series of standards for scientific and technical information. It was based on ISO 999 and adapted to Japanese linguistic features, such as the reading order of Chinese characters. However, Japan currently has no professional association dedicated exclusively to indexing. As a result, many back-of-the-book indexes are produced by authors or publishers without specialized indexing training (Fujita, 2025). The ELIS index examined in this study was likewise created collaboratively by authors and editors rather than by professional indexers.

Despite this breadth of guidance and reflection, empirical evidence on how indexes are actually used remains comparatively thin. A small number of user studies suggest that we still know relatively little about how readers interact with book and ebook indexes in practice (Coe, 2014; 2015; Coe and Wright, 2019). In digital publishing contexts, uneven platform support and the marginal status of indexing within standards such as EPUB have further contributed to the underutilization of indexes in electronic books (Kasdorf, 2023). As a result, while indexing is widely acknowledged as an important access tool, its practical functioning and effects are only partially understood.

Automation research adds another important dimension to this landscape. Subject indexing has a long history of automation experiments, and a broad consensus has emerged that human-machine complementarity is more effective than full replacement (Golub, 2019; 2021). In well-structured domains, production grade systems demonstrate that automated pipelines can successfully support indexing at scale, as illustrated by the National Library of Medicine's systems for MeSH terms (Fernandez-Llimos et al., 2024; Mork et al., 2013). Open source tools such as Annif operationalize multi-algorithm subject term suggestion over controlled vocabularies and continue to be evaluated across domains (Suominen, 2019; Suominen et al., 2022).

For back-of-the-book indexing, however, both classic experiments (Artandi, 1964; Borko, 1970; Dillon and McDonald, 1983) and more recent proposals (Francis and Greenway, 2015; Haidar and Zaraket, 2024; Koutropoulou and Gallopoulos, 2019; Provo, 2019) have repeatedly identified barriers to full automation. These include dispersed narrative structures, rhetorical variation within texts, and policy-driven normalization requirements that are difficult to capture without situated human judgment. Such findings suggest that the core challenges of back-of-the-book indexing are not merely computational but epistemic in nature. A similar point is illustrated by Duncan (2022), who contrasts a computer-generated index with an author-designed one in order to highlight the limits of automation in representing interpretive and navigational structures. While empirical measures and automated tools can function as screening devices or consistency checks, many decisive choices seem to require interpretive judgment about conceptual granularity, disciplinary salience, and symbolic continuity.

Our study focuses on the index of a specialized encyclopedia. As noted in the introduction, encyclopedias are distinctive KO projects that delineate the conceptual boundaries of a discipline. In library and information science (LIS), bibliographic reviews and editorial reflections have documented how encyclopedia making can actively shape disciplinary identities and, in some cases, reinforce particular regional or institutional perspectives (Bates, 2007; 2010; Maack, 2008; see also discussions across editions of the Encyclopedia of Library and Information Science, e.g., Anderson, 2004; Chalcraft, 2004; 2011; Meredith, 1980). These reflections, however, typically emphasize editorial procedures, scope decisions, or experiences of coordination rather than the epistemological assumptions that guided concrete organizational choices.

In particular, indexing policies for specialized encyclopedias have received scant direct analysis. While indexes are frequently acknowledged as essential tools for surfacing dispersed topics, prior commentary rarely examines how index terms are selected, normalized, or cross-referenced in practice. Outside LIS, only a small number of essays touch on encyclopedia indexing, and historical accounts in other domains tend to document local practices without offering systematic, process-level analyses (Wellisch, 1982). To our knowledge, no prior study has examined the construction of a specialized encyclopedia index through an explicit epistemological lens. Retrospective analysis of index construction is especially rare, in part because opportunities to edit and index encyclopedias of this kind are themselves extremely limited. This gap in the literature motivates our empirical focus on the indexing process as a site where epistemological orientations become visible in practice.

Alternatively, some KO scholars have addressed epistemology by classifying the literature itself according to epistemological orientations. Martínez-Ávila and Beak (2016) analyzed Hope Olson's publications through Hjørland's framework, assigning each work to a single stance. While this approach provides a useful overview, the grounds for mutually exclusive assignments are not always evident. Building on this line of inquiry, Machado et al. (2019) conducted a systematic epistemological analysis of concept theory in LIS, classifying relevant works into Hjørland's four epistemic families. Their results confirmed a pragmatic and historicist turn in the field, while rationalist approaches remain visible, and they noted frequent overlaps between stated positions and applied methods.

Beyond such classification efforts, other research emphasizes that real-world KO rarely conforms to a single epistemological stance. Epistemic eclecticism is common in KO system design, where heterogeneous assumptions coexist (Dousa and Ibekwe-Sanjuan, 2014). Contemporary KO is also inherently collaborative, involving participants

with diverse backgrounds and orientations, which makes hybridity the norm rather than the exception. More fundamentally, assigning an epistemological stance presupposes particular commitments, so even the possibility of accurate self-identification depends on one's orientation. Inter-indexer consistency research has long demonstrated that even trained practitioners diverge in their term assignments, pointing to the epistemologically plural character of collaborative indexing in practice (Hjørland, 2024a). More broadly, collaborative indexing has become an increasingly relevant practice in digital environments (Rafferty, 2018), where shared indexing workflows and distributed editorial practices raise new questions about how epistemic norms are negotiated across contributors. This hybridity is therefore not limited to system design but also characterizes lived KO processes, where reasoning shifts and negotiations continually reshape outcomes.

Our study addresses these gaps by examining the index construction process itself. We show how different epistemic orientations intermingle in practice and how empirical checks interact with interpretive judgment. By employing trio-autoethnography, we aim to capture tacit reasoning from multiple perspectives and to exemplify KO as a situated and negotiated epistemic practice.

3. Methods

The case is the ELIS published in Japan, edited between 2019 and 2023. Covering ten divisions and 287 entries authored by 178 contributors, it presents topics ranging from the history and foundations of librarianship and information science, and media theory to approaches to information and techniques of organization, written based on the latest research findings. Entries were stand-alone, typically two pages for readability, aiming to provide an authoritative overview of LIS that balanced international and local concerns. The back-of-the-book index was produced between March and June 2023 and constituted the final stage of the project. It had to integrate a wide range of concepts under strict space constraints while serving multiple audiences, including researchers, practitioners, and students. The indexing team consisted of one coordinator and three indexers, all of whom were also contributors to the encyclopedia. For the present study, the coordinator X, whose specialization is LIS theory, and two indexers, Y, specializing in information organization, and Z, specializing in digital archiving, participated as researcher-participants.

It should be noted that this study did not originate solely within the indexing team. Following the publication of the encyclopedia, X initiated a broader research effort, which led to the establishment of a funded collaborative project titled "How are reference systems of specialized knowledge formed?", led by Y. This project brought together researchers beyond the original indexing team, and the present paper reports one set of findings developed within this broader research framework. The fourth member of the indexing team was unable to participate in the retrospective study due to personal circumstances. While we cannot fully exclude the possibility that their absence introduces some perspective bias, the analysis draws extensively on contemporaneous records and working notes from all team members, including this individual. We therefore believe that the core findings are not substantially affected by their non-participation.

Indexing represents only one layer of epistemic decision-making within encyclopedia production. Upstream practices such as the selection of entries, the composition of the editor in chief and editorial board, the recruitment of contributors, the design of cross-references among entries, and the evaluation of cited literature strongly shape what becomes indexable in the first place. These editorial processes determine the conceptual landscape that the index must ultimately organize. The present study does not analyze these upstream practices systematically. Instead, it treats the index as a downstream crystallization of multiple prior judgments. From this perspective, the index functions as a point where dispersed editorial, authorial, and policy decisions converge and are translated into a concrete access structure. Focusing on indexing therefore narrows the scope of analysis while also sharpening it, by concentrating on a site where abstract commitments and practical constraints must be resolved into explicit organizational choices.

Fig. 1 presents an overview of the indexing process for ELIS. The process began when authors submitted candidate index terms together with their manuscripts. These terms were reviewed by the editorial board to ensure consistency with the editorial guidelines and were revised when necessary. The subsequent indexing work carried out by the indexing team is the focus of this study. This work was conducted in parallel with the proofreading of the manuscripts. The indexing team's work proceeded in three steps. First, all members discussed and established indexing policies and revised them when needed. Second, each indexer prepared draft indexes for the divisions assigned to them. Third, the coordinator integrated these draft indexes and made final adjustments to ensure overall consistency. At the final stage of the process, the publisher and the indexing team jointly conducted proofreading.

We employed an autoethnographic method, which allowed us to examine cultural practices through our own participation. According to Adams and Herrmann (2020), "autoethnographic projects use selfhood, subjectivity, and personal experience ('auto') to describe, interpret, and represent ('graphy') beliefs, practices, and identities of a group or culture ('ethno')" (p. 2). While this approach is gaining traction in library and information science, its prominence is most evident in broader discourses of social justice (Fourie, 2021). In our case, however, we adopted an analytic orientation, aiming not for personal expression but for the systematic description of epistemic reasoning. As

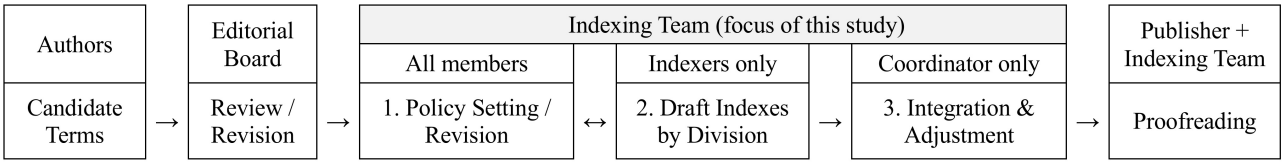

Fig. 1. Workflow of encyclopedia production and indexing.

Anderson (2006, p. 375) defines it, "analytic autoethnography refers to ethnographic work in which the researcher is (1) a full member of the research group or setting, (2) visible as such in the published text, and (3) committed to an analytic research agenda that advances theoretical understandings of broader social phenomena". We chose trio-autoethnography because the phenomenon under study is inherently collaborative. A single- or duo-autoethnography risks under-representing negotiation and role-conditioned perspectives. Working as a trio (coordinator plus two indexers) let us reconstruct decision episodes from distinct roles, cross-check and challenge memories in real time, and treat disagreement as analytic data, thereby reducing individual bias and making negotiation itself observable. While the case study is necessarily bounded in scope, this is consistent with the logic of qualitative case research, in which depth of analysis takes precedence over statistical representativeness.

Before the main analytic phase, we conducted a preliminary review of work logs, editorial notes, and communications from the encyclopedia's production. Using inductive coding, we identified four categories shaping decision-making: (1) indexing work (practical tasks and procedures), (2) indexing policy (explicit and evolving rules), (3) terms and structure (headwords and cross-references), and (4) worker subjectivity (tacit knowledge and professional judgment). Three insights emerged. First, subject knowledge played a central role in headword selection. Second, indexing policy evolved iteratively through practice rather than being fixed in advance. Third, because of rights restrictions and dispersed textual structures, we could not apply automatic or semi-automatic indexing methods in this project. Instead, we relied on manual procedures, occasionally checking term occurrences in gallery proofs, but treating such counts only as auxiliary cues rather than decisive criteria for inclusion or exclusion. These findings informed the design of the main analytic phase by highlighting decision episodes as a unit of analysis and modeling negotiation and exception-handling as legitimate epistemic work.

The main analytic phase consisted of two extended online sessions held in August 2025, which were recorded and transcribed. Annotated worksheets of selected entries, comparative spreadsheets of successive index versions, editorial guidelines, and participant memos served as additional sources for triangulation. To prepare for analysis, we reconstructed a comparative list based on archival production data. This list aligned (1) author- and editor-proposed candidate terms with (2) the final index terms produced by the indexing team. The list explicitly marked additions, deletions, page-number adjustments, normalization changes, and newly created cross-references introduced during the indexing process.

This reconstruction enabled us to identify concrete decision episodes in which the indexers or coordinator modified terms or references. These episodes served as prompts in the first online session, where each participant revisited specific changes and explained the reasoning behind them, drawing on personal notes prepared in advance. In the second session, we revisited the same episodes and discussed which epistemological orientation each decision reflected. At this stage, we began to recognize that not only epistemological orientations but also underlying reasoning modes (deductive, inductive, and abductive) were operative in the decision process. This insight emerged during the analytic process and later informed our discussion.

4. Results

Building on the preliminary review, our results are presented in two parts: first, the epistemic decision criteria observable in practice, second, how different types of reasoning overlapped and shifted within single episodes. The preliminary phase shaped the main study in concrete ways. The four categories it identified (indexing work, indexing policy, terms and structure, and worker subjectivity) directly informed the framing of each episode prompt used in the analytic sessions. The three substantive insights it yielded were equally generative: the centrality of subject knowledge led us to select episodes where headword choice was contested; the finding that policy evolved iteratively directed attention to moments where existing rules proved insufficient; and the reliance on manual judgment highlighted exception-handling and negotiation as the most analytically productive sites. The main phase thus did not treat these insights as background context but as selection and framing criteria that structured what counted as a decision episode worth analyzing.

4.1 Decision Criteria in Indexing Practice

Analysis revealed four types of reasoning corresponding to Hjørland's epistemic orientations, which manifested as concrete decision criteria in practice. These were not abstract philosophical labels but situated justifications articulated in actual indexing episodes.

Rationalist reasoning appeared in appeals to rules, structure, and consistency. As participants, we often recalled the principle that "anyone should obtain the same result if they follow the rules" (Y). For example, the decision to exclude "Asymmetric Digital Subscriber Line (ADSL)" was justified on the grounds that its granularity was inconsistent with the rest of the index. Similarly, cataloging-related entries prompted symmetry arguments such as "if we include 'catalogs (library)', we should also include 'catalogs (museum)' " (Z), reflecting a concern for logical coherence. Another aspect of rationalist reasoning was the reliance on author-provided candidate terms. Authors were expected to identify indexable concepts when submitting manuscripts, and following these proposals was treated as a rule-like procedure. This stance is also consistent with the view, articulated in Japanese indexing manuals (see, e.g., Fujita, 2025), that topics explicitly represented in the document warrant primary consideration. In practice, this stance meant that authors nominated indexable topics, which indexers then normalized and integrated.

Empiricist reasoning was constrained but still present in partial ways. Because of rights and workflow restrictions, the team could not run a full-text frequency analysis of the encyclopedia to generate candidate terms. Nevertheless, indexers sometimes checked the number of pages in which a term appeared or its placement in the body text. Empiricism was rarely decisive, but traces appeared in the coordinator's task of adjusting index page-number assignments, where quantitative considerations about distribution and balance provided indirect evidence. In this role, quantitative considerations about how much space terms consumed or how balanced sections appeared acted as indirect expressions of empiricist reasoning, even though they did not amount to systematic statistical analysis.

Historicist reasoning emphasized symbolic continuity and disciplinary tradition. Although "COVID-19" was not proposed by the authors as a candidate index term, it was included so that "future readers can look back and see how it was discussed at the time" (X), highlighting the encyclopedia's role as a historical record. The integration of literary fiction into literature and the addition of literary theory reflected the enduring weight of the concept of literature and the need to show connections with external domains. The new creation of the related entry "*Bunken*" (originated from Chinese; references/literature) exemplified the dual influence of rationalist systematization and historicist tradition. These cases, which all emerged during the coordinator's stage of work, show that historicist reasoning often intersected with pragmatic or rationalist considerations but nevertheless retained its own justificatory force.

Pragmatist reasoning was especially prominent. Many decisions were justified by appeal to user utility or community salience. "A-LIEP" (Asia-Pacific Library and Information Education and Practice), a professional association in the LIS field, for example, appeared only once in the text but was retained because "it is important from the perspective of library practitioners" and "past professional experience showed its importance" (Y). This illustrates the idea that even terms of low textual frequency should be included when they are strongly recognized within the community, since they serve as navigational points for intended audiences. Similarly, in the treatment of IT-related terms, "Google" was included while "Android" was excluded because "Google is more relevant to LIS as a service" (X). The entry "freedom of expression" was also added even though the phrase itself was not frequent, because it underlies many discussions in the field and appears indirectly through related topics. By indexing it, we ensured that readers could locate these dispersed references to a concept that is often assumed. These decisions frequently involved interpretations that went beyond textual evidence and required inference about community recognition and anticipated user needs. In retrospect, such moves often resembled abductive reasoning, even when articulated in pragmatic terms.

It should be noted that during the actual indexing work, participants were not consciously applying Hjørland's epistemological framework. Decisions were made situationally, under time pressure and practical constraints, without explicit reference to rationalist, empiricist, historicist, or pragmatic stances. The epistemological characterization of these decisions was therefore a retrospective construction, produced through the reflective sessions rather than recoverable from the original process. This temporal gap between action and interpretation is not a methodological limitation unique to this study but a constitutive feature of situated KO practice.

4.2 Overlap and Shifts in Reasoning

While each orientation could be observed in isolation, actual decision episodes frequently combined multiple types of reasoning, with shifts occurring during discussion.

The deletion of "ADSL" illustrates this pattern. The decision was first justified on rationalist grounds as a matter of "oldness" and "granularity inconsistency" (Z) but was also explained pragmatically as "lacking significance for LIS as a discipline" (X). Both arguments supported deletion, yet they stemmed from different orientations. Participants themselves noted that they sometimes could not distinguish whether a given justification was rationalist or pragmatic, underscoring the fluidity of reasoning in practice.

Other cases showed similar hybridity. The inclusion of "COVID-19" combined historicist reasoning (long-term reference value) with pragmatic reasoning (reflecting social concern). In the case of "IFLA LRM" (International Federation of Library Associations and Institutions Library Reference Model), rationalist document-oriented reasoning held that index references should be limited to the pages where the topic is explicitly explained (Y), whereas pragmatic reasoning argued that references should be expanded

by considering the concept's significance for LIS (X). The inclusion of "freedom of expression" was justified both as a pragmatic anchor for readers and as a historically significant concept in LIS. In the case of "democracy", Indexer Z treated it mechanically, reasoning that "since the author had listed it as a candidate term, this must be the topic". The coordinator X, however, reviewed the encyclopedia as a whole and included additional locations where the concept is addressed, while also recognizing that given space constraints too many pages devoted to it might overwhelm readers, a pragmatic concern.

Overall, these episodes show that indexing practice does not proceed according to a single epistemic script. Rules and counts often served as starting points, but decisions were revised considering contextual reasoning grounded in user needs, disciplinary significance, or symbolic continuity. These insights are based on retrospective reflection: at the time of production, the decision-making process followed the workflow shown in Fig. 1. Under tight deadlines, indexers worked on their assigned sections while the coordinator reviewed the index as a whole and carried out the final adjustments. Although the team discussed and agreed on some general rules before starting the work, the final decisions rested with the coordinator, and the coordinator's epistemic orientation shaped the overall outcome.

From a reasoning perspective, many episodes appeared to follow a recognizable pattern: initial deductive application of rules, followed by inductive checking of textual distribution, and finally abductive resolution oriented toward anticipated user benefit. We note, however, that this characterization is itself a retrospective interpretive act: the reasoning-mode vocabulary (deductive, inductive, abductive) was not applied as a coding framework during analysis but emerged as a descriptive observation in the course of dialogic reflection. We therefore do not claim to have systematically demonstrated this pattern, but rather propose it as a heuristic observation that warrants more rigorous examination in future work. Its analytical implications are taken up in the Discussion. These role-conditioned differences were also visible within specific episodes. The "COVID-19" inclusion and the treatment of "democracy" both show the coordinator drawing on historicist and pragmatic reasoning to take a field-wide view, while the indexers' accounts in those same episodes emphasized rule-application and divisional consistency, a pattern discussed further in Section 5.

5. Discussion

Our analysis of indexing episodes yields several key insights into the epistemic practices that shaped the construction of the encyclopedia index. First, pragmatic reasoning often proved decisive when different orientations came into conflict: what ultimately mattered was whether a decision would make the index more useful for readers. Second, epistemic heterogeneity was the norm rather than the exception. Rationalist, empiricist, historicist, and pragmatic arguments frequently coexisted within the same episode, shifting and combining as discussion unfolded. Third, the final outcome depended strongly on role differences within the team. The coordinator, responsible for the overall index, often adopted a broader horizon, weighing user perspectives and historical continuity. Indexers working on local sections, by contrast, sometimes focused more narrowly on rules and deadlines, favoring efficiency and structural consistency. These role-based orientations show that epistemic reasoning is shaped by organizational position.

These findings have several implications for KO theory. Hjørland's four orientations remain a useful vocabulary, but our results show that real-world practice is not governed by a single stance but by fluid interaction among several. This provides empirical support for critiques of rigid categorization. At the same time, we acknowledge that eclecticism or complementary models are not universally embraced. Hjørland has argued that, although epistemological purism cannot be fully realized, eclecticism is not necessarily a viable alternative, since certain epistemological commitments may be fundamentally in tension with one another (Fuller et al., 2013, p. 2). Our study reinforces the view that hybridity and negotiation should be treated as constitutive features of KO processes, rather than as anomalies or exceptions. By highlighting how orientations overlapped, shifted, and were prioritized differently depending on role and context, we add empirical detail to the theoretical claim that epistemological stances in KO are always situated, partial, and negotiated.

At this point, however, a conceptual difficulty becomes apparent. Throughout our analysis, many decisions were described as pragmatic, yet it was not always possible to determine whether they met Hjørland's stricter definition of pragmatism, which emphasizes explicit reference to values, goals, and social consequences, or whether they reflected practicalism: context-sensitive problem-solving aimed at workable outcomes without such explicit value articulation (Hjørland, 2014). This ambiguity is in part structural: trio-autoethnography and retrospective reconstruction surface the justifications participants could articulate after the fact, but the tacit reasoning operative during production may not have been sufficiently value-explicit to meet the threshold of pragmatism in Hjørland's sense. In several episodes, decisions were justified by anticipated usefulness or professional relevance without explicit articulation of values or long-term objectives. We therefore treat this irreducible ambiguity as an empirical finding rather than a methodological shortcoming: as noted in Section 4, epistemological orientations were not operative as explicit commitments during production but were assigned through dialogic reflection afterward, which means that the boundary between pragmatism in Hjørland's strong sense and context-sensitive problem-solving cannot be recovered

from retrospective data alone. It follows that epistemological classification in empirical KO research is always, to some degree, an interpretive act performed after the fact. This finding has implications for how such frameworks are applied in future studies.

This is where trio-autoethnography proved its methodological value, making this ambiguity visible rather than obscuring it. Dialogic reflection enabled participants to question each other's interpretations of decision episodes and to surface assumptions that had remained implicit during production. In several cases, what initially appeared to be a purely pragmatic justification was reinterpreted, through discussion, as resting on tacit norms concerning disciplinary responsibility, inclusiveness, or anticipated readership. This finding underscores the importance of methodological approaches capable of eliciting tacit reasoning when epistemological frameworks are applied empirically in KO research.

This retrospective character of epistemological attribution points toward an alternative analytic level that we propose for future work. Rather than asking which epistemological orientation a decision reflects—a question that can only be answered retrospectively—one might instead ask what reasoning structure it instantiates. Such a question operates closer to the observable structure of decision episodes and may therefore be less susceptible to post-hoc interpretive distortion. We did not pursue this analysis systematically here, in order to maintain comparability with existing KO scholarship, but we propose it as a productive direction for future empirical work.

While the primary theoretical contribution of this study concerns the dynamic and negotiated character of epistemological orientations in KO practice, the indexing episodes we analyzed also surfaced ethical dimensions that warrant discussion. Beyond questions of analytic vocabulary, the epistemic and subjective nature of indexing raises ethical considerations that our study also brought into relief. Decisions about which terms to include, how to name them, and how to structure their relationships inevitably influence what knowledge becomes visible and accessible to users. In our case, the indexing team was conscious of representing the LIS field broadly and sought to include significant concepts and perspectives. Nevertheless, any indexing process risks privileging some viewpoints while marginalizing others. Acknowledging the subjectivity of indexers, as our method explicitly does, is one way to bring such value-laden choices to the surface instead of hiding them behind an appearance of neutrality. By making reasoning transparent, indexing teams open their decisions to scrutiny and improvement by others, which is ethically desirable. Our collaborative approach also provided a built-in system of checks and balances: differences in expertise and perspective among the trio meant that individual assumptions were challenged and refined. This plural perspective is an ethical strength of collaborative KO, as it helps to mitigate blind spots or biases that any single indexer might introduce.

These concerns are directly theorized in the literature on epistemic justice. Fricker's (2007) concepts of testimonial and hermeneutical injustice provide tools for analyzing how decisions about term inclusion, naming, and cross-referencing can structurally disadvantage certain knowledge claims or render them unrecognizable within an established vocabulary, even when no such exclusion is intended. Patin et al. (2021) extend this framework explicitly to information professionals, arguing that indexing and classification practices can perpetuate or interrupt epistemic injustice depending on how gatekeeping decisions are made. Most directly relevant to a field-defining encyclopedia, Patin et al. (2024) show how classificatory systems of record can participate not only in the erasure of individual knowledge claims but also in the destruction of entire epistemic frameworks. In our case, the team's shared positioning within Japanese academic LIS provides deep insider knowledge but also creates a potential blind spot with respect to geographic, linguistic, and paradigmatic traditions that are less visible from that location. We therefore treat this limitation as an ongoing ethical responsibility rather than a fully resolved problem.

Taken together, these theoretical, methodological, and ethical reflections suggest several directions for future research. First, integration with reasoning-mode analysis (deductive, inductive, abductive) offers a micro-analytic vocabulary for comparing decision moves across contexts. Second, multi-case studies are needed to examine whether similar negotiation patterns, such as staged movement from rules to evidence to pragmatic application, appear across domains. Third, more systematic attention should be given to role differences. Our observations suggest that the coordinator, tasked with maintaining a global view, naturally invokes user-oriented or historicist reasoning more often, while the two indexers may lean toward rule-based efficiency. Mapping these role-conditioned orientations would enrich both KO theory and training practice. Fourth, future studies should experiment with epistemic lenses beyond Hjørland's four orientations, especially virtue epistemology (Turri et al., 2021). Approaching indexing through virtues such as conscientiousness, fairness, and intellectual humility would allow us to analyze not only reasoning outcomes but also the qualities of good practice. Related frameworks, such as embodied cognition (Fincher-Kiefer, 2019) or posthuman accounts of distributed agency (Braidotti, 2019), could further illuminate how bodily presence, affect, and human–nonhuman entanglements shape indexing decisions. From Hjørland's perspective, such approaches might ultimately be subsumed under one of the four established orientations; yet even so, they suggest alternative perspectives for practical inquiry. While we cannot elaborate concrete programs here, we suggest that virtue-based, embodied, or posthuman approaches could inspire alterna-

tive questions about how ethical commitments, bodily situatedness, and distributed agency condition KO practices. These perspectives thus offer not only theoretical breadth but also a reserve of ideas for future empirical exploration.

At the same time, it is important to acknowledge the limits of an analysis that focuses exclusively on the back-of-the-book index. Indexing represents only one layer of epistemic decision-making in encyclopedia production. A more comprehensive account would also need to examine upstream and parallel processes, including the selection of entries, the composition of the editor in chief and editorial board, the recruitment of authors, the design of cross-references among entries, and the evaluation of cited and referenced literature. These editorial practices strongly condition what becomes indexable in the first place. The present study therefore captures a downstream crystallization of earlier epistemic judgments rather than the full set of practices through which disciplinary knowledge is organized. Recognizing this limitation clarifies the scope of our contribution. By focusing on the index, we analyze a site where dispersed editorial, authorial, and policy decisions intersect and are translated into a concrete access structure. Future studies could extend this approach by combining analyses of indexing with studies of entry selection, editorial deliberation, and citation practices across the full lifecycle of encyclopedia production.

A further methodological limitation concerns the use of retrospective reconstruction as an analytic procedure. While revisiting decision episodes enabled reflection that was not possible in real time, this approach also introduces the risk of post-hoc rationalization or artificial consensus, in which participants converge on interpretations that retrospectively appear more coherent than the original reasoning may have been. Additionally, the triangulation among participants who occupied different roles and levels of decision-making authority, namely the coordinator versus the indexers, may have introduced asymmetric influence on the analytic process. The coordinator's broader mandate and retrospective access to the integrated index may have conferred interpretive authority that was not fully balanced by the indexers' accounts. Having overseen the index as a whole, the coordinator retained a more comprehensive view of cross-referencing decisions that individual indexers, working on local sections, may not have shared. This constitutes a structural asymmetry that retrospective discussion alone may not fully correct.

6. Conclusion

This case study has shown that constructing the back-of-the-book index for a Japanese LIS encyclopedia was not a neutral or mechanical task, but an epistemic practice shaped by judgment. Rationalist, empiricist, historicist, and pragmatic forms of reasoning each surfaced in specific episodes, yet what ultimately proved decisive was whether a decision would make the index more useful for readers. Our observations also suggest a strong relationship between roles and orientations, hinting that role position may influence epistemic stance, though individual traits may also play a part. Rather than a single coherent stance, indexing practice consisted of shifting and sometimes conflicting logics that were continually negotiated and adjusted. This hybridity was not incidental but constitutive, showing that KO practices are inherently situated, plural, and negotiated across multiple dimensions.

As with any retrospective analysis, our findings are shaped by the limits of memory and interpretation. We mitigated this through triangulation of records and cross-checking among participants, but selective recall cannot be entirely ruled out. Moreover, this study focused solely on the back-of-the-book index of a single encyclopedia; entry structures and citation patterns were not systematically analyzed.

In conclusion, the index should be understood not merely as a retrieval aid but as a cultural artifact that crystallizes decisions about what counts as knowledge, for whom, and for what purposes. By foregrounding this epistemic and ethical dimension, our study underscores indexing as a practice where theoretical orientations and practical judgments converge, and where negotiation among them becomes the very condition of KO. Although this study focused on a Japanese case, the finding that epistemic orientations dynamically interact and vary with roles or individual perspectives suggests a generalizable pattern relevant to collaborative KO projects in other domains and countries. Our results do not reject Hjørland's framework but extend it toward a dynamic model of epistemic negotiation.

Complementing the above directions, we highlight a methodological gap. While our analysis frequently described decisions as "pragmatic", we were not always able to determine whether they met Hjørland's (2014) stricter sense of pragmatism, which requires explicit discussion of values and goals, or whether they reflected "practicalism", which focuses on what worked under the circumstances. Developing clearer criteria to distinguish these orientations in empirical material remains an important task. Such criteria would not reduce epistemological positions to surface indicators, nor replace theoretical interpretation. Rather, they would aim to identify the observable ways in which epistemological commitments are enacted and articulated in situated practice. Approaches such as coding value articulation, goal specification, and community-oriented justification, combined with process-tracing data such as think-aloud protocols, may contribute to making these enactments more analytically visible.

Building on the reasoning-mode perspective introduced in Section 5, a purpose-designed future study might distinguish deductive reasoning (applying general rules to specific cases), inductive reasoning (generalizing from observed evidence), and abductive reasoning (inferring the most plausible explanation under uncertainty). In our own

data, many rationalist arguments took the form of deduction; empiricist checks often resembled induction; pragmatic resolutions frequently had an abductive character. These modes were not mutually exclusive but layered and interwoven within single episodes. A study that codes both epistemological orientation and reasoning mode from the outset—ideally observing collaborative decision-making in real time rather than reconstructing it retrospectively—would allow their interaction to be examined more precisely.

Availability of Data and Materials

All data reported in this paper will be shared by the corresponding author upon reasonable request, subject to restrictions related to proprietary index data and third-party permissions.

Author Contributions

AH, RS and AN designed the research study. AH, AN, RS performed the research and analyzed the data. RS drafted the article, and AH and AN revised it critically for important intellectual content. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

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Conflicts of Interest

The authors declare no conflicts of interest.

Declaration of AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work the authors used ChatGPT-5.3 in order to check spelling and grammar. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

References

Adams TE, Herrmann AF. Expanding our autoethnographic future. Journal of Autoethnography. 2020; 1: 1–8. https://doi.org/10.1525/joae.2020.1.1.1

Anderson JD, Pérez-Carballo J. The nature of indexing: how humans and machines analyze messages and texts for retrieval. Part I: Research, and the nature of human indexing. Information Processing & Management. 2001a; 37: 231–254. https://doi.org/10.1016/s0306-4573(00)00026-1

Anderson JD, Pérez-Carballo J. The nature of indexing: how humans and machines analyze messages and texts for retrieval. Part II: Machine indexing, and the allocation of human versus machine effort. Information Processing & Management. 2001b; 37: 255–277. https://doi.org/10.1016/s0306-4573(00)00046-7

Anderson JD. The Encyclopedia of Library and Information Science, by Miriam A. Drake. The Library Quarterly. 2004; 74: 384–386. https://doi.org/10.1086/422783

Anderson L. Analytic autoethnography. Journal of Contemporary Ethnography. 2006; 35: 373–395. https://doi.org/10.1177/0891241605280449

Artandi S. Automatic book indexing by computer. American Documentation. 1964; 15: 250–257. https://doi.org/10.1002/asi.5090150403

Bates MJ. An operational definition of the information disciplines. In Proceedings of the iConference 2010 (pp. 19–25). Urbana-Champaign. University of Illinois. 2010.

Bates MJ. Defining the information disciplines in encyclopedia development. Information Research. 2007; 12: paper colis29. Available at: https://informationr.net/ir/12-4/colis/colis29.html (Accessed: 10 February 2026)

Borko H. Experiments in book indexing by computer. Information Storage and Retrieval. 1970; 6: 5–16. https://doi.org/10.1016/0020-0271(70)90009-4

Bosschieter P. Back-of-the-book indexing in the Netherlands today. The Indexer. 2006; 25: 86–88. https://doi.org/10.3828/indexer.2006.23

Braidotti R. Posthuman Knowledge. Polity: Cambridge. 2019.

Chalcraft A. Encyclopedia of Library and Information Science (2nd edition). Reference Reviews. 2004; 18: 8–9. https://doi.org/10.1108/09504120410559429

Chalcraft T. Encyclopedia of Library and Information Sciences (3rd edition). Reference Reviews. 2011; 25: 9–11. https://doi.org/10.1108/09504121111102976

Coe M. What do readers expect from book indexes and how do they use them? An exploratory user study. The Indexer. 2015; 33: 90–101. https://doi.org/10.3828/indexer.2015.25

Coe M. Where is the evidence? A review of the literature on the usability of book indexes. The Indexer. 2014; 32: 161–168. https://doi.org/10.3828/indexer.2014.52

Coe M, Wright J. Looking for needles in a haystack: how do ebook reader applications handle active indexes? Part 1 – ereader and Web browser software. The Indexer. 2019; 37: 125–140. https://doi.org/10.3828/indexer.2019.17

Dai L. Book indexing in China. The Indexer. 2008; 26: 3–7. https://doi.org/10.3828/indexer.2008.3

Dillon M, McDonald LK. Fully automatic book indexing. Jour-

nal of Documentation. 1983; 39: 135–154. https://doi.org/10.1108/eb026744

Diodato V, Gandt G. Back of book indexes and the characteristics of author and nonauthor indexing: Report of an exploratory study. Journal of the American Society for Information Science. 1991; 42: 341–350. https://doi.org/10.1002/(sici)1097-4571(199106)42:5<341::aid-asi4>3.0.co;2-7

Dousa TM, Ibekwe-SanJuan F. Epistemological and methodological eclecticism in the construction of knowledge organization systems (KOSs): The case of analytico-synthetic KOSs. In Proceedings of the Thirteenth International ISKO Conference (pp. 152–159). 2014.

Duncan D. Index, A History of the: A Bookish Adventure from Medieval Manuscripts to the Digital Age. W. W. Norton & Company: New York. 2022.

Fernandez-Llimos F, Negrão LG, Bond C, Stewart D. Influence of automated indexing in Medical Subject Headings (MeSH) selection for pharmacy practice journals. Research in Social & Administrative Pharmacy : RSAP. 2024; 20: 911–917. https://doi.org/10.1016/j.sapharm.2024.06.003

Fincher-Kiefer R. How the Body Shapes Knowledge: Empirical Support for Embodied Cognition. American Psychological Association: Washington, DC. 2019.

Fourie I (ed.) Autoethnography for Librarians and Information Scientists. Routledge: London. 2021.

Francis RD, Greenway M. A simple system for constructing an end-of-book index. Journal of Scholarly Publishing. 2015; 46: 290–296. https://doi.org/10.3138/jsp.46.3.06

Fricker M. Epistemic Injustice: Power and the Ethics of Knowing. Oxford University Press: Oxford. 2007.

Fugmann R. Subject analysis and indexing: Theoretical Foundations and Practical Advice. Index Verlag: Frankfurt am Main. 1993.

Fujita S. Book indexing in Japan: An overview and a review of the Japanese translation of the index of Dennis Duncan's Index, a history of the. The Indexer. 2025; 43: 15–48. https://doi.org/10.3828/index.2025.4

Fuller S, Hjørland B, Ibekwe-SanJuan F, Ma L, Mai JE, Tennis J, et al. Uncovering epistemological assumptions underlying research in information studies. Proceedings of the American Society for Information Science and Technology. 2013; 50: 1–4. https://doi.org/10.1002/meet.14505001015

Golub K. Automated Subject Indexing: An Overview. Cataloging & Classification Quarterly. 2021; 59: 702–719. https://doi.org/10.1080/01639374.2021.2012311

Golub K. Automatic subject indexing of text. ISKO Encyclopedia of Knowledge Organization. 2019. Available at: https://www.isko.org/cyclo/automatic.htm (Accessed: 10 February 2026)

Haidar N, Zaraket FA. Back-of-the-book index automation for Arabic documents. arXiv. 2024. https://doi.org/10.48550/arXiv.2410.10286 (preprint)

Hjørland B. Indexing: Concepts and theory. ISKO Encyclopedia of Knowledge Organization. 2024a. Available at: https://www.isko.org/cyclo/indexing (Accessed: 10 February 2026)

Hjørland B. Is facet analysis based on rationalism? A Discussion of Satija (1992), Tennis (2008), Herre (2013), Mazzocchi (2013b), and Dousa & Ibekwe-San Juan (2014). Knowledge Organization. 2014; 41: 369–376.

Hjørland B. Social epistemology. ISKO Encyclopedia of Knowledge Organization. 2024b. Available at: https://www.isko.org/cyclo/se.htm (Accessed: 10 February 2026)

Japan Society of Library and Information Science (ed.) The Encyclopedia of Library and Information Science. Maruzen Publishing: Tokyo. 2023. (In Japanese)

Kasdorf B. Ebooks in EPUB format can (and should) include indexes. The Indexer. 2023; 41: 127–134. https://doi.org/10.3828/index.2023.17

Koutropoulou T, Gallopoulos E. TMG-BoBI: Generating back-of-the-book indexes with the Text-to-Matrix-Generator. In Proceedings of the 10th International Conference on Information, Intelligence, Systems and Applications (IISA) (pp. 1–8). IEEE: Piscataway, NJ. 2019.

Lancaster FW. Indexing and Abstracting in Theory and Practice. University of Illinois, Graduate School of Library and Information Science: Champaign, IL. 1991. (In Japanese)

Maack M. Place and space as presented in English-language library and information science encyclopedias. 2008. Available at: https://web.archive.org/web/20240217183214/http://archive.ifla.org/IV/ifla74/papers/091-Maack-en.pdf (Accessed: 10 February 2026)

Machado LMO, Martínez-Ávila D, Simões, MdGdM. Concept theory in library and information science: An epistemological analysis. Journal of Documentation. 2019; 75: 876–891. https://doi.org/10.1108/JD-11-2018-0195

Martínez-Ávila D, Beak J. Methods, Theoretical Frameworks and Hope for Knowledge Organization. KNOWLEDGE ORGANIZATION. 2016; 43: 358–366. https://doi.org/10.5771/0943-7444-2016-5-358

Meredith J. The Encyclopedia of Library and Information Science: A review of reviews, a summary evaluation and a suggested salvage operation. Canadian Library Journal. 1980; 37: 411–419.

Mork JG, Jimeno Yepes A, Aronson AR. The NLM medical text indexer system for indexing biomedical literature. Bioinformatics. 2013; 29: 143–152.

Mulvany N. Indexing Books. 2nd edn. University of Chicago Press: Chicago. 2005.

Norris J, Sawyer RD, Lund DE (eds.). Duoethnography: Dialogic Methods for Social, Health, and Educational Research. Routledge: New York. 2016.

Patin B, Sebastian M, Yeon J, Bertolini D, Grimm A. Interrupting epistemicide: A practical framework for naming, identifying, and ending epistemic injustice in the information professions. Journal of the Association for Information Science and Technology. 2021; 72: 1306–1318. https://doi.org/10.1002/asi.24479

Patin B, Youngman T, Hauser E. Toward an Etiology of Harm

for Knowledge Organization: Onto-Epistemic Injustice in Classificatory Systems of Record. KNOWLEDGE ORGANIZATION. 2024; 51: 495–513. https://doi.org/10.5771/0943-7444-2024-7-495

Provo A. From index to network: topic maps in the Enhanced Networked Monographs project. The Indexer. 2019; 37: 13–35. https://doi.org/10.3828/indexer.2019.3

Rafferty P. Tagging. ISKO Encyclopedia of Knowledge Organization. 2018. Available at: https://www.isko.org/cyclo/tagging (Accessed: 10 February 2026)

Smiraglia RP. The Elements of Knowledge Organization. Springer: Cham. 2014.

Suominen O. Annif: DIY automated subject indexing using multiple algorithms. LIBER Quarterly: the Journal of the Association of European Research Libraries. 2019; 29: 1–25. https://doi.org/10.18352/lq.10285

Suominen O, Inkinen J, Lehtinen M. Annif and Finto AI: Developing and implementing automated subject indexing. JLIS: Italian Journal of Library, Archives and Information Science. 2022; 13: 265–282.

Turri J, Alfano M, Greco J. Virtue epistemology. The Stanford Encyclopedia of Philosophy. 2021. Available at: https://plato.stanford.edu/entries/epistemology-virtue/ (Accessed: 10 February 2026)

Ullstrom S, Zafran EL. Is embedded indexing a worthwhile pursuit for indexers? A qualitative survey of current practices and thoughts for the future. The Indexer. 2025; 43: 57–75. https://doi.org/10.3828/index.2025.6

Wang YX. Indexing software in China: Past, present and future. The Indexer. 2009; 27: 124–127. https://doi.org/10.3828/indexer.2009.39

Wellisch HH. More on indexes in encyclopedias (and on one encyclopedia index). The Indexer. 1982; 13: 3–5.