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Research Libraries’ Diverse Orientations to an Algorithmic Future

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Abstract: This article addresses the question of the future of research libraries by exploring the recent literature on libraries and artificial intelligence (AI) or – as we prefer to call these emerging technologies – algorithms. We apply the anthropological concepts of the future by Bryant and Knight as lenses of analysis and identify examples from the literature under six future orientations: anticipation, expectation, speculation, potentiality, hope, and destiny. Through the examples that describe research libraries’ approaches to algorithm-powered technologies, we aim to demonstrate that there are alternative time views for approaching the future. By questioning our narratives about the new technologies, we aim to join the collective deliberation on algorithmic futures.

Keywords: Research libraries; academic libraries; future; artificial intelligence; algorithms

Unterschiedliche Ausrichtungen von Forschungsbibliotheken auf eine algorithmische Zukunft

Zusammenfassung: Der Artikel befasst sich mit der Zukunft der Bibliotheken auf der Grundlage neuer Literatur über Bibliotheken und künstliche Intelligenz (KI) oder – wie wir für diese sich entwickelnden Techniken vorziehen zu sagen – Algorithmen. Als Grundlage der Analyse verwenden wir den anthropologischen Ansatz von Bryant und Knight und finden in der Literatur sechs zukünftige Orientierungen: Befürchtung (anticipation), Erwartung (expectation), Vermutung (speculation), Möglichkeit (potentiality), Hoffnung (hope) und Bestimmung (destiny). Anhand der Beispiele, die den Umgang von Forschungsbibliotheken mit algorithmusgestützten Technologien beschreiben, möchten wir zeigen, dass es alternative Zeitansichten für den Umgang mit der Zukunft gibt. Durch die Untersuchung unserer Diskussion der neuen Technologie wird versucht, die gemeinsamen Überlegungen zu einer algorithmisch geprägten Zukunft zusammenzuführen.

Schlüsselwörter: Wissenschaftliche Bibliotheken; Zukunft; künstliche Intelligenz; Algorithmen

1 Introduction

In 1990, as third-year graduate students, we practiced using personal computers with a pale grey Macintosh 128K desktop machine. The clumsy exercises with the compact “Mac” mainly served our curiosity, as we were more inclined to learn the skills of hand and eye in the analogical world. How little we knew about the digital transformation that would come and shape our world. How little did we consider the future and the transformation which these simple desktop computers were already heralding.

Today, we deliberately direct our curiosity towards new technologies, especially the phenomenally emerging artificial intelligence (AI) applications, because we are better aware of the revolutionary impacts of digitisation. Since the launch of ChatGPT at the end of 2022, the world has woken up to the realisation that the power of AI can fundamentally reshape our everyday lives. Therefore, we test and play with the new tools – and appear triumphant when the machine makes an error.

In our quest to master the new technology, we tend to focus on solving the issues in hand and improving the perceived shortcomings in our services. In research libraries, we seek improvements from AI with metadata production and classification of library resources,¹ material discovery and access,² managerial decision-making,³ and other pressing challenges in library operations.⁴ The current library operations seem within our control and are, therefore, an obvious focus for our attention.

The tendency to short-termism is a prevailing condition in our contemporary societies.⁵ However, there are nevertheless industries and professions that are committed to pursuing goals in the far future. Engineers who plan nuclear waste repositories must envision a vantage point 10

1 Suominen (2019).

2 Jakeway (2020), Schoeb et al. (2020).

3 Ennis et al. (2013).

4 See also Gasparini and Kautonen (2022).

5 Fisher (2024) 13–103.

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of thousands of years from today.⁶ A centuries-old – if not a millennia-long – timescale is the mission of institutions that foster the cultural heritage of humanity. As Ovenden⁷ has argued, ignoring the importance of the work of libraries and archives for the collection, preservation, accessibility, and even the digitisation of knowledge is a peril to our civilisation. Further, he notes: “The preservation of knowledge is fundamentally not about the past but the future.”

The article’s commission was to contemplate the future for research libraries. If we turn our gaze another 34 years forward from 2024, we see the year 2058. What will we be doing in research libraries at that time? Will AI have revolutionised our operations and services as profoundly as the first wave of digitisation did after 1990? Or will AI have taken all our jobs, as some Doomsday prophets have threatened? Instead of predicting future library activities, we focus on the expressions of temporalities in today’s discussions about new technologies. We base our elaboration of the subject on the understanding of technology as a socio-technical system where humans are an essential part of the assemblage. Moreover, we second the arguments of Ruckenstein⁸ and consider technological systems as affective infrastructure⁹ in our society. According to Ruckenstein, individual and collective reactions and “affections” can serve as “windows to contemporary socio-technical changes”.

Thus, we utilize conceptualisations from anthropology as theoretical lenses to guide the analysis of research libraries’ temporal trajectories through time. From an anthropological point of view, time is not something outside humans but is instead an element that is formed by and forms human activity. Temporalities are ingredients of our everyday practices, such as meeting agendas, as well as our traditions, such as annual festivals. Using Rebecca Bryant and Daniel M. Knight’s¹⁰ concepts of vernacular orientations to the future, we explore the discourses about the future of research libraries. We introduce Bryant and Knight’s theories and concepts in detail in section 2.

The article contributes to the discussion on the impact of technology on our society. We focus on the phenomenon of artificial intelligence (AI), which has recently stimulated vivid discussion across the globe and within academic communities. We argue that the discussion on AI reveals the potentiality of research libraries’ futures and shows

the variety of directions that unfold before our professional community. By exploring future orientations about research libraries and AI, we can outline future directions for any other relevant aspect of research libraries’ work. In other words, we are not interested in the technology of AI but in research libraries’ feelings and considerations about their future with this new technology. To highlight this, we encourage the reader to replace any reference to the AI phenomenon with an equivalent in the discussion about, for example, open science (OS) or sustainable development goals (SDG).

To bypass the ambiguity and misinterpretations related to the term AI¹¹ we prefer to use the term algorithm when referring to the new technologies, tools, and systems expected to influence and evolve with us. Moreover, we consider AI to be a term that may soon become outdated, since it refers to a dynamically changing set of technologies and applications. For us, algorithm refers to the socio-technical arrangement of people and code, i. e., recipes for technical operations and instructions, which are in dynamic interplay when we carry out tasks and solve problems.¹² However, when referring to the literature, we use the terms of the source.

Further, this article aims to challenge narrowed understanding of time. In addition to short-termism, our contemporary society is accused of being bound to “horological” time, colonizing other forms of temporality.¹³ By presenting diverse orientations to the future and examples from the literature, we contribute to the discussion about alternative “time views”. We argue that the future of research libraries can be approached with various orientations instead of limiting our arguments to the dichotomy of opportunities and challenges.

We draw the knowledge about research libraries’ algorithmic future from literature. However, we emphasise that our subjective interest in the topic influences our understanding of the phenomenon and related sentiments in the library community. We have participated in national and international discourses on AI and other new technologies and, furthermore, have conducted workshops about the use of algorithm-powered technology in research libraries. These experiences inevitably build an undercurrent to our interpretations and conclusions.

⁶ Ialenti (2020).

⁷ Ovenden (2020).

⁸ Ruckenstein (2023).

⁹ In Ruckenstein (2023), the concept “affective infrastructure” refers to the notion of experiences, emotions, and feelings that ordinary people have of the algorithms integrated in their everyday life.

¹⁰ Bryant and Knight (2019).

¹¹ C. f. Wheatley and Hervieux (2022).

¹² Ruckenstein (2023) 3.

¹³ Bryant and Knight (2019) 190.

2 Libraries' Diverse Future Orientations with Algorithms

In this chapter, we examine research libraries' future orientations using the six concepts identified by Bryant and Knight as lenses of observation. In each of the following sub-sections, we first introduce the meaning of the concept, i. e., the respective future orientation and its distinctive features. At the end of the section, we present a drawing (image) that visualises our understanding of these concepts and their (subtle) differences.

The rest of each sub-section consists of examples of each orientation in the context of research libraries. As the introduction explains, we focus on research libraries' diverse orientations to emerging algorithm-powered technologies. To show the simultaneous existence of diverse viewpoints on the future, we have deliberately drawn these examples from the literature published within the past six years (2019–2024).

2.1 Anticipation: Libraries Preparing for the Transformation of Their World

Anticipation is the first future orientation that Bryant and Knight¹⁴ define. They explain that anticipation has a “thick” sense of the past in the present, usually concentrated on a feeling of anxiety or uncertainty. Anticipation leads to people's “just-in-case” actions towards the future. Bryant and Knight state: “In such times of anticipation, the past becomes a resource for rewriting the future in the present.” Although the visual representation of anticipation is *storm clouds* (see the image at the end of this section), the orientation holds the potential to be both positive and negative. Bryant and Knight also describe anticipation with the “uncanny present” concept.

Research libraries often express feelings of anticipation when they discuss their future with algorithm-powered technologies. Literature on AI and machine learning (ML) in libraries includes many accounts laden with anxiety and even fear that the new technology will profoundly challenge and transform how libraries operate and serve their users and society.¹⁵ Some studies predict that the new technologies may replace librarians, particularly in regard to repetitive tasks.¹⁶ As the following example indicates, libraries

may prepare themselves individually and collectively for the world of machines.

An example of anticipatory orientation to new technologies can be found in Nayyer and Rodriguez's¹⁷ article, published in the prominent collection about AI and libraries edited by Hervieux and Wheatley.¹⁸ Motivated by their understanding that technical solutions are not neutral, Nayyer and Rodriguez illustrate the problematic features of algorithms used, especially in ML applications. They emphasise the importance of understanding how modern technologies work and, consequently, the reasons for the implicit bias that may lead to unwanted consequences for academic activities. Nayyer and Rodriguez explain: “The machine learning-driven AI algorithm differs from simple executable algorithms. It does not merely draw from an encyclopaedic body of knowledge and execute a task its algorithm instructs it to do. Rather, the ML algorithm is written to cause the tool to train itself from data supplied to it and to learn from its own executions.”

By exploring the sources and implications of implicit bias in machine learning applications, Nayyer and Rodriguez draw a picture of a landscape of all over looming ethical concerns. They explore the distinction between unsupervised and supervised ML, the impact of used learning data, and the influence of human coders on the biased outcome. They also address the challenges of power and control of technology development: “the power to develop AI tools relates directly to access to, ownership of, or control over big datasets. Most amassed big data that could be useful to academic libraries and information workers are held by a few stakeholders, and the masses are generally unaware of what is in that data or the details of the algorithms.”

Although Nayyer and Rodriguez encourage libraries to seek and establish guidance or supervision for ethical, bias-free use of AI/ML applications, the overall tone of the article is concerned for the future. In the end, the article notes a challenge: “an effective supervisor must have a broad and deep knowledge of the issue and model or problem-solving algorithm, the range of variables, and likely predicted outcomes”. This is a challenge for librarians, as Nayyer and Rodriguez continue by proposing that librarians can help technology developers find ethical solutions to the issue of bias.

¹⁴ Ibid. 21–48.

¹⁵ Gasparini and Kautonen (2022), Griffey (2019).

¹⁶ Asemi et al. (2020).

¹⁷ Nayyer and Rodriguez (2022).

¹⁸ Hervieux and Wheatley (2022).

2.2 Expectation: Libraries Building a Brighter Future

The second future orientation presented by Bryant and Knight¹⁹ is expectation. They describe it as an inseparable counterforce to *anticipation* with a similar conjecture to the past but a qualitatively different mode of approaching the future. Where *anticipation* is characterised by uncertainty and preparation for unpleasant consequences ("a rainy day"), *expectation* relies on the conservative experiences of the past. The established paths and feelings direct expectation-laden actions towards "normal horizons" (see the image at the end of this section). Expectation creates "time-spaces" of promise and prospect.

The earliest indications of research libraries' interest in algorithmic technologies have been characterised by expectation. As early as 1976, Smith optimistically envisioned that machines could be used to "enhance the possibilities of discovery".²⁰ The new technology was – and still is – mainly considered a means of improving existing library operations and practices, such as cataloguing, subject indexing, information retrieval, and collection management.²¹ Due to efforts for greater efficiency, the research community has already witnessed many achievements in algorithm-powered library operations.²²

As an example of libraries' expectation-laden orientation to the future, we present Ridley's²³ article about explainable artificial intelligence (XAI). Ridley's motivation for exploring the challenges of AI derives from "concerns about bias, unfairness and veracity" as well as "troubling questions about user agency and power imbalances" in our algorithmically mediated lives. These concerns are the same as described by Nayyer and Rodriguez (in the previous section). However, Ridley has elaborated on the countermeasures and argued for libraries to adopt and advocate for XAI.²⁴ "XAI is a toolset for critical assessment and accountability", states Ridley, and continues that, among other goals, it is needed to generate trust and transparency, ensure compliance with regulations and legislation, and minimise or mitigate bias and unfairness.

To guide academic libraries towards a better, trustworthy future, Ridley presents the prerequisites and elements of an XAI strategy. He lists accountability techniques used with former technological solutions, such as audits, standards,

and regulations, and describes how they can be applied with AI. For example, Ridley notes: "vendors of library content or systems utilizing machine learning should make explanatory proofs and validations available for library inspection." In Ridley's article, the future for libraries holds expectations for a positive outcome.

We found another example of expectation-oriented text in the already mentioned collection on AI in academic libraries. In their article, Wheatley and Hervieux²⁵ encourage librarians to abandon their doubts and insecurity about AI and other new technologies. They highlight that librarians' existing expertise and skills are beneficial in the transforming technology landscape. They further note: "Librarians are also known for their adaptability and willingness to learn, which makes them perfect candidates to adopt and teach AI literacy." Thus, Wheatley and Hervieux's article affirms that librarians' core competencies and experiences from the past can show the path to the desirable future.

The main part of the article describes a workshop series that features current research library fundamentals in relation to AI. First, Wheatley and Hervieux report on their first workshop and demonstrate how the AI equivalent of information literacy competence can be built. They continue by explaining about the workshops for librarians on AI ethics and algorithmic bias, and finally, the workshop on the implications of using AI applications during the research process. Wheatley and Hervieux sum up this experiment as a great learning experience for themselves, but they also point out the enthusiasm of workshop participants. They conclude by sharing their intentions to continue developing AI workshops and a framework for AI literacy – which can be seen as a gaze towards the "normal horizon" in the future.

As expectation draws from the present and history, it is not surprising that libraries approach algorithm-based technologies using the same methods and targeting the same aims as existing technologies. The previous examples indicate that libraries may orientate to the future with expectation in order to reap the possibilities for a brighter future.

2.3 Speculation: Libraries Exploring the Unknown

Further on, Bryant and Knight²⁶ define the third future orientation, *speculation*, as a moment of confusion and anxiety caused by some disruption to the past. When compared to *anticipation* and *expectation*, *speculation* must fill the gap

¹⁹ Bryant and Knight (2019) 49–77.

²⁰ Smith (1976).

²¹ Cox et al. (2019).

²² Awesome AI for LAM (n. d.). The AI4LAM community updates a list of ongoing projects and resources.

²³ Ridley (2022).

²⁴ See also Ridley (2019).

²⁵ Wheatley and Hervieux (2022).

²⁶ Bryant and Knight (2019) 78–104.

from the present to the future without existing pathways or presumptions of good or bad consequences. Bryant and Knight note: "What, however, of the case in which no past seems suitable, where all expectation based on experience has been shattered, and we do not yet know what anchors we may find to allow us to anticipate the next day." According to Bryant and Knight, speculation is a short-term orientation, a "temporal vertigo" that can turn to either confidence or deception. They define speculation as a moment of conjecture, fantasy and imagination that leads to alternative temporal routes. Our visual representation of this orientation is *bridging the gap* (see the image at the end of this section).

When the news of ChatGPT reached the consciousness of research libraries in 2023, many of us felt that the new technology had shattered our understanding of the future. The library community entered the phase of speculation about how the large language models or other forms of AI would change our way of working and serving our users.²⁷

As our first example of speculative future orientations, we present a case study about AI-powered search tool testing by Wildgaard et al.²⁸ The authors, who worked for the Royal Danish Library, had conducted a multi-phase testing of available AI-powered search tools that were aimed at improving the efficiency of discovering academic literature. The article reports the phases of the case study with scholarly rigour and in an ostensibly neutral manner. Throughout the selection of tools for testing, the information specialists' think-aloud tests of the selected tools, the research hackathon with information specialists and researchers, and finally, the expert assessment of the hackathon outcomes, Wildgaard et al. kept up the speculative aspect: Do these AI-powered search tools provide added value for the academic search process? When reaching the ultimate phase of their project, they note: "However, as the results of our tests pointed to the immaturity of the tested AI-search tools, the project was closed after Phase 2. A service infrastructure was not developed."

The Danish case study reveals speculative conjectures about research libraries' roles and alternative routes to the future. While the authors did not approve any of the tested tools, they appreciated that such tools that harvest global open access repositories can promote openly available literature and data. The authors also note that these tools "have the potential to challenge one's preconceptions and reduce cognitive bias in the search process." They conclude by predicting "a paradigm shift in information seeking practice that demands new terminology, understanding, standards

and expectations" that would affect both researchers and information specialists working in research libraries.

Our second example of speculative future orientation in libraries presents a novel conceptualisation of the role of algorithm-based systems. In his article about machine information behaviour (MIB), Ridley²⁹ challenges the understanding that research libraries are solely in service to human information behaviour. He notes: "Just as human information behaviour has shaped academic libraries, so too will machine information behaviour be a critical factor and have a profound impact."

The article does not reach far in its imagination or speculation about librarians' interaction with machines. However, Ridley outlines a novel conceptual model that is based on Wilson's general theory of information behaviour.³⁰ The MIB model joins the core functions of AI to Wilson's foundational concepts and outlines the characteristics of this "new patron" approaching the services of research libraries. As Ridley notes, the model is a preliminary "starting point upon which to build further elaboration and contextualisation." In other words, Ridley's model is a speculative opening to the future of library and information science (LIS) research, but also for library practitioners.

Approaching the future with a speculative mindset is based on curiosity and exploration. Speculation requires abandoning previous knowledge from the past and "thinking outside the box." As our examples indicate, libraries are willing to take a speculative view of the future and to explore the unknown.

2.4 Potentiality: Libraries Improving their Competencies

According to Bryant and Knight,³¹ the fourth future orientation is *potentiality*, which they describe as the "present pregnant with possibilities" and even the opposite. Potentiality is the "not-yet-actual" that may fill the "gap between rest and movement." Potentiality relies on immanent capacity, the real dimensions of existence and actions. Bryant and Knight emphasise the pervasive aspect of potentiality in our future orientations because we cannot act if there is no potential to act. Furthermore, in order to make something happen, potentiality needs to lead to choices. To illustrate these aspects, we position potentiality in the figure of *cross-roads* in our visual representation of future orientations (see the image at the end of this section). Bryant and Knight

27 Vogus (2023).

28 Wildgaard et al. (2023).

29 Machine Information Behaviour (2022).

30 Ridley's reference was Wilson (1997), see also Wilson (2000).

31 Bryant and Knight (2019) 105–31.

also point out the value-laden aspect of potentiality: “In what circumstances [...] may potentiality serve as a proxy for a politics that directs our future”?

In libraries’ relation to algorithmic futures, their concern about adequate competencies has been a major issue. To bridge “the skills gap”, “the management gap” and other recognised gaps between librarians’ existing skills and the challenges associated with the new technologies, libraries’ needs have been analysed and various recommendations made. For example, librarians are encouraged to extend their knowledge of ML³² and data science to become more “data savvy”.³³ The following examples indicate libraries’ wishes to improve their competencies at different levels.

As an example of orientation to potentiality, we present a recent study by Shal et al.³⁴ on leadership styles and AI acceptance in academic libraries. By conducting a correlation analysis on questionnaire data gathered from librarians across four Arab countries, the researchers could draw conclusions about the potentiality of different leadership styles to adopt AI technologies. Shal et al. argue that “the effective implementation of AI by academic librarians is most pronounced when guided by a framework of transformational leadership”. They also report how other leadership styles influence workplace cultures for or against AI acceptance. The findings of their study indicate that the tenets of transactional leadership “may not align seamlessly with the dynamic requirements of AI integration”. Further, they note: “Academic librarians under laissez-faire leadership may be more inclined to view AI as easy to use but not necessarily as directly useful in their work”. To us, the study shows the diverse directions of potentiality and the presence of “pregnant with” possible and contrary competencies.

Although Shah et al. report their research and findings with praiseworthy scholarly rigour, we paid attention to their value-laden (“political”) indications of potentiality. We can understand that the researchers prefer effective implementation and seamless integration of AI in academic libraries, best supported by transformational leadership, over slower or less committed modes of AI adoption. Shah et al. argue for “a leadership paradigm more conducive to the dynamic demands of technological interaction”. They warn against a “substantial threat to the successful implementation of AI”, thus indicating their techno-optimistic world view. Within the potential future orientations, individual research libraries or librarians may have more pessi-

mistic feelings about technology and, therefore, may choose to act differently.

Another article exploring librarians’ competencies shows a wider spectrum of potential approaches to AI in academic libraries. The conceptual paper by Cox³⁵ joins the perspectives of library and information science (LIS) literature with the notions from the sociological theory of the professions. After a well-balanced elaboration of the literature and theoretical frameworks, Cox proposes potential academic library approaches to AI for knowledge discovery. In a table spread on two pages, Cox speculates on eleven diverse approaches and the required activities (“what is involved”) and skills, the estimated costs (“low/med/high”), the risks and their likelihood, and the jurisdiction or hybridity of each approach. These approaches vary from doing nothing through to participatory activities to building AI tools in-house in an academic library. This itemization of approaches for knowledge discovery underlines the idea that libraries have many options and levels for adopting AI for their operations and services. Thus, the article offers a showcase of potential future directions for research libraries in one of their areas of expertise.

From the example of knowledge discovery, Cox further discusses the changing role of the library profession. He contemplates the tension between traditional library values (“the professional logic”) and external pressures for efficiency, accountability, and customer orientation (“the managerial logic”), arguing for hybridity between these logics. He also notices the competition for “jurisdiction” between professions within academic institutions. He notes that an analysis of competencies needed for the use of AI in the library is also useful “from a workforce planning and curriculum development perspective”. We understand this as an indication of strategic-level orientation to the future and as an example of the potentiality of the library community.

2.5 Hope: Libraries Upholding the Light of Knowledge

Bryant and Knight³⁶ continue their definitions of future orientations and define *hope* as a strongly “affective” future orientation. According to them, “hope emerges in the gap between the potential and actual”. It is a wishful “not-yet” future, a “timespace that influences action towards the desired future”. Hope relies on the imagining of better circumstances and a rhetoric that can illustrate this vision. Thinkers or “speakers of hope” are messengers who can

³² Cordell (2020).

³³ Burton et al. (2018).

³⁴ Shal et al. (2024).

³⁵ Cox (2023).

³⁶ Bryant and Knight (2019) 132–57.

restore pride, a future that is better than the present or than previous experiences. From some viewpoints, Bryant and Knight note that hope may be seen as dreaming or as a form of propaganda, and as such, it increases the motivation to act. Our visual illustration of hope is a *rainbow* (see the image at the end of this section).

The public and scholarly discourses about libraries' future in the era of algorithms are more typified by expressions of concern, expectations, and speculations than "affection-laden" hope. To find at least some examples, we scanned the literature for even modest indications of librarians' desired role in an algorithm-powered future.

The first example presents a qualitative study by Andersdotter³⁷ on the AI skills and knowledge of Swedish librarians. The motivation to examine librarians' skills with the new technology derives from their twofold responsibility for running library operations and simultaneously providing information literacy training for their users. Andersdotter followed a "learning circle" of over a hundred librarians and conducted self-efficacy tests on them during the learning circle. The study and its results can be seen as denoting anticipatory or speculative orientations to the future, but the critical undertone refers to a wish for "better circumstances". In Andersdotter's words: "Ethics, surveillance, privacy, trust, transparency, and public debate are concepts that are being renegotiated in an information society development fuelled by AI." She refers to libraries' role as upholders of human rights, intellectual freedom, and privacy. She also draws connections between algorithm-awareness and information literacy as a skill set necessary both for librarians and their "customers".

The orientation of hope can be detected in Andersdotter's concluding remarks. She makes a note of the connection between local library practices and global values and norms, referring to the description of librarianship by IFLA (International Federation of Library Associations and Institutions) "as a profession with ingrained ethical values regarding the use and dissemination of information". The last sentence of the article contains a sustaining and uplifting message for all librarians: "Informed citizens are key to good governance; librarians are key to informed citizens".

Our other example of hopeful orientation emphasises the importance of humane and ethical considerations in developing intelligent technologies. Johnson's³⁸ article about technology innovations and AI ethics describes the power of algorithm-powered technologies to transform our societies. Johnson depicts a future where important human decisions will be made "by human-machine alliances powered by

'cognitive computing' systems to enable outcomes beyond anything humans might accomplish on their own". He also warns about "weaponized" forms of AI and proposes that ethical governance of technology requires "humanities leadership". As a message of hope for research libraries, Johnson states: "Librarians have begun grappling with the ethical nature of this situation and with the imperative of structuring a viable and sustainable future for delivering information".

2.6 Destiny: Libraries Fulfilling their Mission in Changing Times

The last future orientation that Bryant and Knight³⁹ define is *destiny*. They define it as an orientation to the immanent and "beyond-the-horizon" future that even cannot be expected to become actual. For individuals or communities, destiny is a narrative that gives a sense of purpose and is the ultimate cause that helps overcome the obstacles that life may bring. It is an affective element of necessity. Destiny may also be felt as a longing for an as yet unfulfilled future. There are examples in our culture of this "amor fati", which we illustrated as a *sign* that points beyond the horizon (see the image at the end of this section).

As Ovenden⁴⁰ has demonstrated, libraries are institutions with a strong mission that has remained almost the same throughout centuries. Librarians may consider this mission a destiny that helps them to orientate towards the unknown, even sometimes a scary future and pursue the purpose "beyond the horizon". New technologies may emerge and disappear, while libraries continue to fulfil their mission: to provide access to information.

A well-recognised position paper by Padilla⁴¹ describes the purpose of the library community in the era of algorithm-powered technologies by naming this desired direction as "responsible operations". Padilla addresses his message beyond libraries to their stakeholders in universities, technology companies collaborating with libraries, and funders investing in data science, ML and AI technologies in these communities. The paper outlines responsible directions for managing collections, data, methods, tools, services, competencies, and collaboration. Padilla expresses libraries' mission in one sentence: "By committing to responsible operations, the library community works to do good with data science, machine learning, and AI".

³⁷ Andersdotter (2023).

³⁸ Johnson (2019).

³⁹ Bryant and Knight (2019) 158–91.

⁴⁰ Ovenden (2020).

⁴¹ Padilla (2019).

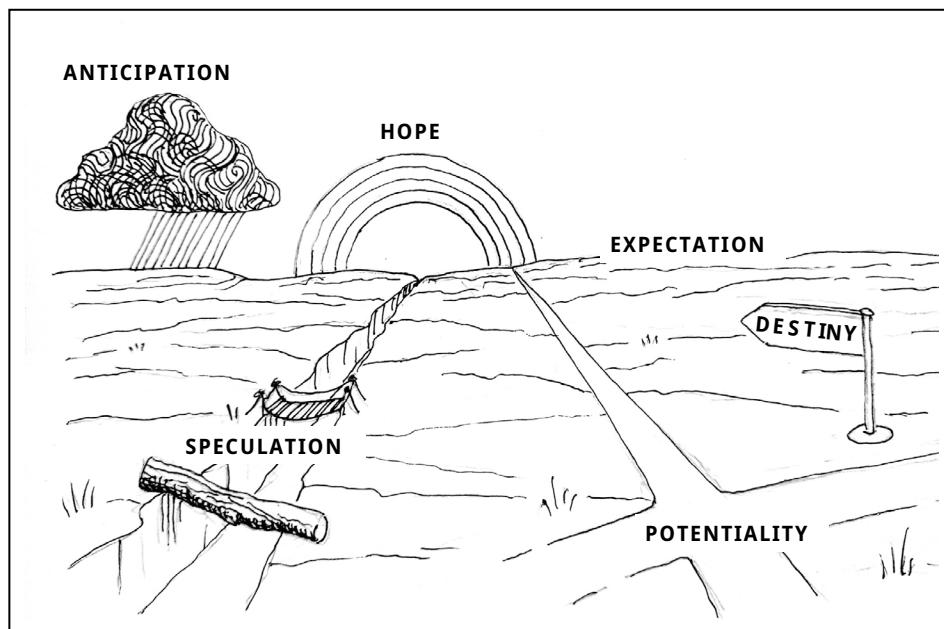


Fig. 1: Visual interpretation of different anthropological orientations to the future: anticipation, expectation, speculation, potentiality, hope, and destiny, based on the concepts by Bryant and Knight (2019)

Our last example of libraries' future orientations, an example of an expression of destiny concerning the development of algorithm-powered technologies, is an industry report from Sweden. In their article about developing an NLP-based (natural language processing) BERT (bidirectional encoder representations from transformers) model, Haffenden et al.⁴² explore the role of libraries in the AI landscape and refer to the literature familiar from previous parts of this article. What makes this particular article stand out as an expression of libraries' destiny can be read in the conclusions. Haffenden et al. state the democratic rationale for locating new technology development within libraries instead of with technology companies. They argue that the libraries' collections "constitute a form of commons" that should be utilised as widely as possible, for example, for making language models. They also see a utilitarian benefit in public authorities implementing the new technology and "releasing open-source NLP tools for the public use as they see fit". While AI may transform the work of libraries, libraries may also find a significant role in the future development of AI.

Finally, Haffenden et al. conclude with arguments for democratic viewpoints in the development of AI technologies. They address "the sociopolitical risks of relying on vast, unaccounted-for web material" in training language models. They also express their doubts about the ethical

approach of private technology giants, such as Google, currently leading the AI development.

These examples indicate that library and information professionals may also see and declare their mission in relation to the new phenomena that shape their ecosystems. Hervieux and Wheatley⁴³ note: "Libraries and their like have existed for millennia; they progress with society, altering and adapting their services to meet the information needs of their communities".

3 Conclusion: Simple or Diverse Narratives of the Future?

What does the future for research libraries look like? Concerning algorithm-powered technologies, as this article indicates, it looks like the view through a kaleidoscope: the same elements take a different position, which changes the entire narrative to anticipatory, expectant, potential, hopeful, or destined. By examining recent literature on libraries and their algorithmic future and using Bryant and Knight's future orientations as tools of analysis, we have aimed to shift the focal point from technologies to the human orientations and understandings about the future.

⁴² Haffenden et al. (2023).

⁴³ Hervieux and Wheatley (2022).

The illusions of neutrality and timelessness seem to overwhelm our discourses on technology. Ruckenstein⁴⁴ argues: "The common way of approaching technologies as either an opportunity or threat stands in a way of finding alternatives". We also need alternative time views to technology. Given the importance of temporality in our everyday activities and language, it is paradoxical that we tend to consider the concepts of time as irrelevant. Fisher⁴⁵ notes: "We tend to look at the world throughout various well-established lenses – political, social, financial – but we need a perspective that is *temporal* too." In this article, we have focused on the temporal perspective of libraries' relation to algorithms and disassembled it to six diverse future orientations.

We acknowledge the major limitation of this exercise in the arbitrary association of examples under the presented future orientations. Most, if not all, articles reflected the topic from different viewpoints and argued both for the opportunities and challenges of the new technology. Therefore, the elements that led us to position one article under *anticipation* and another under *hope* were minimal nuances rather than explicit differences. Still, we hope the reader can appreciate our attempt to highlight the diversity of approaches.

While the article is concerned with algorithms affecting the future of research libraries, the presented orientations could be applied in considering other emerging or existing megatrends in the academic community and society. Open science, sustainable development goals, or geopolitical situations all require a view beyond our present issues and challenges. Depending on our perceptions of and orientations to the future, we act – and shape our future accordingly. Therefore, our narratives of the future are significant.

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