Against the Grain

The (Not So) Accidental Ontologist and other Tales of Alternative Librarianship

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The (Not So) Accidental Ontologist and other Tales of Alternative Librarianship

by **David Bender** (Manager, Medical Ontology, Radiological Society of North America) <dbender@rsna.org>

Introduction

Back in the days of my misspent youth, I was often told that librarians were soon to be cast upon the dust heap of history. Things have not changed with the advent of the new millennium, and like clockwork we still have harbingers of doom trot out to tell us librarians are on the way out. I am supposing that in another 30 years we will still be told the demise of librarianship is nigh. Yet we are still here. What gives?

Then, as now, all of these predictions of the demise of the profession are wrong in that they confuse the temporary nature of the tools of the trade with the timeless principles of librarianship. The physical instances of the profession may come and go: the bound catalog, books of vellum, index cards, CD-ROMs, and, soon enough, the microchip. But regardless of the tools, the end goal of the profession has always been the same: the organization, classification, and retrieval of information. This continuation of the principles of librarianship despite the ephemeral nature of the tools is best illustrated in my current position, Manager of Medical Ontology for the **Radiological Association of North America (RSNA)**. While I may use taxonomies and ontologies instead of subject headings, I am still performing the basic tasks of organizing, classifying, and retrieving information.

RSNA and its Ontology

The **Radiological Society of North America** may be one of the biggest organizations you have never heard of. We are an international society of radiologists, medical physicists and other medical professionals, with more than 54,000 members from 136 countries across the globe. We host the world's premier radiology forum, drawing approximately 55,000 attendees annually. We also publish two peer-reviewed journals: *Radiology*, the highest-impact scientific journal in the field, and *RadioGraphics*, the only journal dedicated to continuing education in radiology. Additionally, **RSNA** develops and offers informatics-based software solutions in support of a universal electronic health record.[1] It is at the intersection of publishing and informatics where the duties of a manager of medical ontology come into play.

At this point you may be asking yourself what are these ontology things you manage? Formally, an *ontology* is an organizational system designed to categorize and help explain the relationships between various concepts of a given field of knowledge.[2] An ontology differs from a taxonomy in that an ontology goes beyond merely defining the parent-child relationships between terms (or classes) to further delineate the specific properties of each term or class. See Figure 1. Informally, an ontology is simply a detailed, granular cataloging schema and authority list.

RadLex and RadLex Playbook

The crowning achievement of **RSNA's** informatics program is RadLex, which is a radiologic ontology created to serve as a unified and controlled vocabulary for the practice of radiology.[3] The RadLex ontology is meant to be a prescriptive vocabulary, delineating the standardized terms to be used in radiologic reporting. The resultant goals are to improve clinical communication in radiology, foster clear and consistent reporting in medical records, and facilitate the uniform indexing and retrieval of radiology information resources. To achieve these goals, **RSNA** has deployed RadLex in the Radiology Reporting Initiative (also known as Structured Reporting), the RadLex Playbook, and the Common Data Elements project. The prescriptive terminology of RadLex serves as the "atoms" for these projects and initiatives.

The clinical report is the essential record of the diagnostic service that radiologists provide to their patients. It communicates the diagnosis to the patient and the care team, provides information for data analytics, and documents the episode of patient care. The ability to efficiently create consistent, high-quality reports is thus critical to the value that radiologists contribute to the process of care. The **RSNA** Radiology Reporting Initiative is improving radiology practice by creating a library of clear and consistent report templates. These templates make it possible to integrate evidence collected during the imaging procedure, including clinical data, coded terminology, technical parameters, measurements, annotations, and key images. Twelve subcommittees of sub-specialty experts and several leading radiology departments have created a library of more than 200 radiology report templates. The templates are free and not subject to license restrictions on their reuse.[4]

Similarly, the RadLex Playbook provides a standard system for naming radiology procedures, based on elements that define an imaging exam, such as modality and body part. By providing standard names and code for radiologic studies, the RadLex Playbook can facilitate a variety of operational and quality improvements, including workflow optimization, billing and fee management, radiation dose tracking, enterprise integration, and image exchange. Up to now, radiologists have used idiosyncratic codes and names for radiology exams, terms that they have created themselves or acquired from vendors of radiology systems. This approach has limited interoperability in applications for data analysis and exchange that need standardized information on radiology procedures in order to work effectively. These playbook codes create the standardized and structured datasets that facilitate the efficient flow of information across platforms and institutions.[5]

Common Data Elements (CDEs) are standardized terms for the collection and exchange of data. CDEs are metadata; they describe the type of data being collected, not the data itself. A basic example of metadata is the question
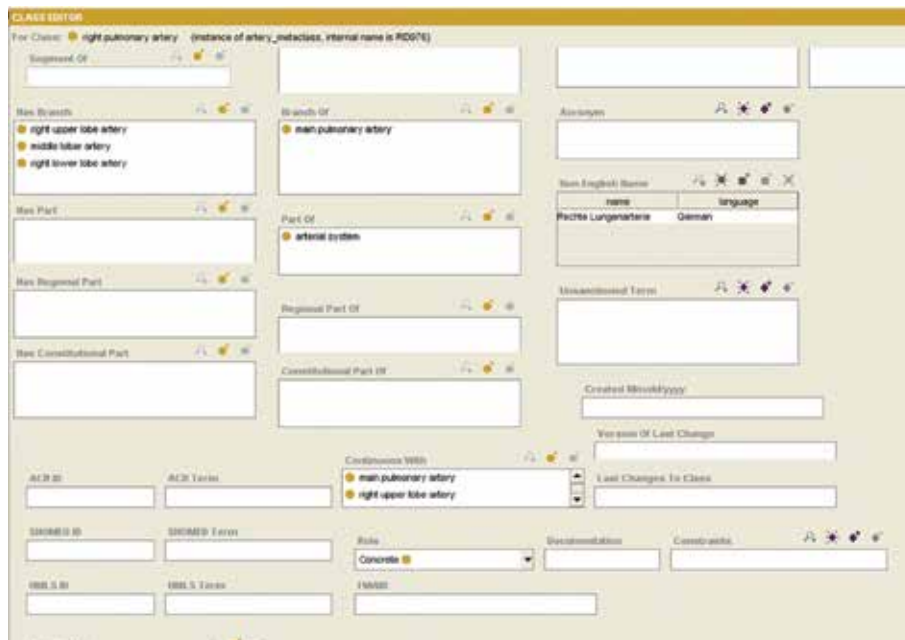

Figure 1: An example of the various properties belonging to the term (class) *right pulmonary artery*.

presented on a form, "Patient Name," whereas an example of data would be "Jane Smith." While CDEs may seem like simple and easily executable concepts, the reality of the situation is quite different. If anyone is in doubt, go and pull out your old copy of the AACR2 and dig through all of the directions required for each line of a MARC record.[6]

These initiatives have proven to be very successful. The number of Radiologic Report template downloads now numbers of over two million. While RadLex Playbook download numbers may seem minimal at 1,000, the number of downloads does not reflect the true adaptation of the RadLex Playbook. RadLex Playbook as a whole has been adopted by several medical enterprise software systems, and thus the codes are already in place and ready to be used out of the box.

A more important indication of the success of the RadLex Playbook is the development and expansion of the **American College of Radiology (ACR)** Dose Index Registry. The registry is a program that collects the actual radiation dosages by imaging procedure from radiology practices all across the country. All of the information is then compiled, and every quarter the radiologist receives a report of what size dose was used for a given procedure, and how that dose compares to the average dose for that geographic region and the kind of institution the radiologist works in. Thus a doctor who works at a public hospital in the Southeast may find that her dosages are a little higher than similarly situated radiologists, and another doctor at a research hospital in the Northwest may find that his doses are lower.[7]

Figure 3: Related content for the article *Radiology* article Cardiac MR Imaging of Nonischemic Cardiomyopathies: Imaging Protocols and Spectra of Appearances.

Figure 2: A table for the 224 different names for a single procedure, standardized under a single RadLex Playbook ID.

This kind of dosage repository is made possible through the wide acceptance and usage of the RadLex Playbook codes. Before standardization, every institution created its own procedural codes; for example, a CT procedure for imaging the brain that did not use a contrast agent had 224 different codes across 60 different institutions.[8] See Figure 2. With each procedure having a unique procedure code consistent across all practices, the compilation of data is completely automatic. The radiologist's workstation can send the information directly to registration, and no filtering is required to place the information in the right slot.

One size Fits All ... or does it?

While RadLex has been widely successful in these applications, it is not a one-size-fits-all tool. But when one has a hammer, everything starts looking like a nail, and **RSNA** wished to apply RadLex to every semantic and tagging issue it encountered. This is where a person with a traditional library education becomes a valuable resource: To address this issue, I hearkened back to my days at **Indiana University**, where students were often wont to argue over the merits of Dewey versus the **Library of Congress (LC)** classification system. While many tried to maintain the superiority of one system over the other, cooler heads understood that each system worked well in certain kinds of circumstances. Dewey fit well into traditional public library and school settings, while **LC** is generally more useful in the large academic library setting.

I found the same to be true with RadLex. RadLex works well in projects where "prescriptive" vocabularies are important, such as in structured reporting and coding, where the goal is to standardize terminology to increase the ease with which like information can be retrieved. However, RadLex does not work well in projects where "descriptive" terminology is required. By "descriptive" terminology, I mean projects where a taxonomy reflects the terminology that is actually being used, not the terminology that ought to be used. Allow

me to illustrate this by describing the case that brought this dichotomy to light here at **RSNA**.

Journals and Continuing Education

RSNA publishes two very highly regarded journals, *Radiology* and *RadioGraphics*.[9] One of the features of the online version of these journals is the related content widget. When an actual journal article is viewed, a box on the right rail is populated with a short list of links to *Radiology* and *RadioGraphics* articles on the same topic as the article currently being viewed. There is a second box on the right rail with a similar list of links to digital posters, educational exhibits, and other annual meeting content. See Figure 3. The related content in these widgets is determined by an algorithm that weighs the number and relevancy of tagged terms from a predefined list. The more this list overlaps with the checked content, the more accurate the related matching will be.

As mentioned earlier, **RSNA** was thinking of RadLex as a one-size-fits-all taxonomy. This, however, was not the case in the application of RadLex to the related content. Only 17% of the terminology in RadLex was actually found in the set of the ten most recent years of *Radiology* and *RadioGraphics* articles. There are two main reasons for this lack of overlap. The first is the specificity of RadLex terminology. Objects have many qualifiers attached to the term, such as right, left, posterior, and anterior. The second reason, related to the first, is the prescriptive nature of RadLex. RadLex is a body of terms one ought to use, as opposed to terms that authors and researchers actually use when they are writing. For the sake of specificity one ought to say "L4 root of right obturator nerve," but when actually writing a research article, one would explicitly use "obturator nerve root" and the rest of the description would be implicit in the context.

Given the lack of overlap between RadLex and journal content, it was apparent that we had to bifurcate our semantic enrichment projects. RadLex would continue on its course, but

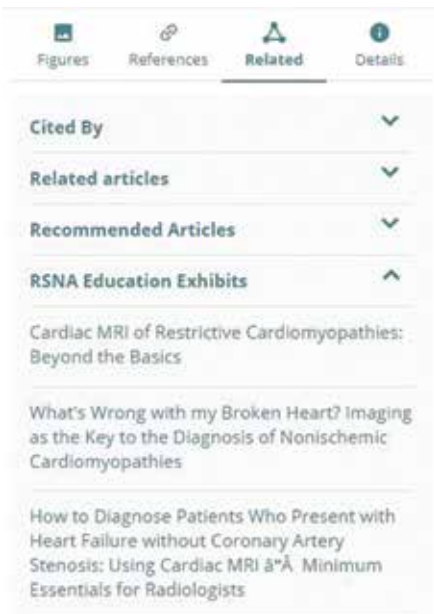we would develop alternative taxonomies to better fit the needs of the editorial and publishing projects of **RSNA**. To create this new journal-based taxonomy, we began with the RadLex terms that are actually found in journal content and used that structure as the framework for the new taxonomy. This new taxonomy is updated on a regular basis with terminology that is unique to journal content. What that means in practice is that I read each issue of *Radiology* and *RadioGraphics* and identify the new and up-and-coming terms that are making their way into the radiologic lexicon and add them to the taxonomy.

This understanding that one size does not fit all has been taken several steps further. Just as RadLex does "fit" with journal content, the taxonomy for journal content does not "fit" with other content-tagging projects **RSNA** has initiated. We decided to start tagging the Continuing Education (CE) courses,[10] but the journal-based taxonomy of 9,000+ is just far too detailed for the CE catalog. We have over 20,000 journal articles in the journals database but only a couple hundred CE courses at any given time, so we created a 150-term taxonomy that provides a sufficient level of detail for the small number of CE documents.

Without my presence, it may very well have been the case that **RSNA** would be using a 45,000-term taxonomy to tag the CE articles. This is not an indictment of the organization, but rather a caution against what can happen if an organization does not have a true information professional on hand to identify and guide information organizational needs. Thankfully for me and **RSNA**, the organization understood this situation and created the position of ontology manager.

Peer Review

Last, but not least, my library skills have been put to further use with the addition of peer reviewer management tasks to my workload. All of the content of our journals is peer reviewed, and it is the role of the peer review managers ensure that the manuscripts are read by qualified reviewers. While much of my job involves cataloging skills, peer review management is far more akin to reference work. The manuscript has a need, and that is to find the proper reviewer. However, just like real-life patrons, it often takes some wheedling to find out what the topic of a manuscript really is. Authors identify reviewer terms, but more often than not, the terms selected are not as accurate as they could be. Similarly, the reviewers have selected terms to describe their expertise, but those are not always accurate either, so the peer review manager has to identify the real topic of the manuscript and match it with a reviewer who is really an expert in that area.

Conclusion

Thus, whether you call it cataloging or semantic enrichment, or peer review management instead of the reference interview, the processes involved are nothing new. They are the same tried-and-true principles of librarianship that have been practiced for centuries. Librarianship is far from dead, and librarians have much to offer modern information producers.

In fact, most professional societies across the spectrum have staff performing these functions, but generally not by librarians. Ontology is so new that ontologists are often just an IT professional or editor grabbed at random and given the duties. Hopefully, more organizations will realize the value that a library science trained information manager can add to the organization, and more of these nontraditional library positions will be created and filled by librarians. 🐾

Endnotes

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that designs the tools library staff use to connect readers with the books that they need, is retiring! I remember back in 1994 when **Duncan** was running statewide continuing education services for librarians in North Carolina, and one of the workshop requests that kept coming up was help training people to help readers find their next book to read. In June 1999, **EBSCO Publishing** completed negotiations for the acquisition of **NoveList**, **CARL Corporation's electronic readers' advisory resource** for fiction readers. **EBSCO Publishing** Division general manager **Tim Collins** said: "This acquisition is a major component of our commitment to provide libraries with the resources they need to serve all of their users. **NoveList** will be a core component of our program to meet the needs of fiction readers regardless of the type of library they use." *https://www.ebscohost.com/novelist-the-latest/blog-article/a-look-back-with-duncan-smith?_ga=2.207055568.2106522522.1534112561-1959297392.1534112561*

The dapper **David Parker** is celebrating a five-year work anniversary. **David** is Senior Director, Documentary, Film, Education Video, Licensing, Publishing and Distribution at **Alexander Street, a ProQuest Company**. I remember when **David** was founder of **Business Expert Press** back in 2008-2013.

Speaking of **BEP**, the marvelous **Sheri E. Dean** Marketing Director, **Business Expert Press** and **Momentum Press**, has agreed that **BEP** will sponsor the **International Fast Pitch award** in Charleston this November!

Another celebration — The how-does-she-keep-all-her-ducks-in-a-row **Cris Ferguson** is celebrating a five-year work anniversary as **Director of Technical Services** at **Murray State University**. **Cris** is also the guest editor of *ATG's* Nov 2018 print issue dealing with **the ways in which libraries are financially supporting university curricula**.

Heather Ruland Staines, **Director, Business Development**, *Hypothes.is* is celebrating her work anniversary. **Heather** has had a whirlwind career so far exploring the nexus of academic publishing, library technology, and the future of eLearning. **Heather** is currently, focusing on business development and publisher relations.

As we go to press, **Professor Mark Beattie** has been appointed the new **Editor-in-Chief** of *Frontline Gastroenterology*. The journal publishes articles about innovative and best practice in the fields of gastroenterology and hepatology and it is **co-owned with the British Society of Gastroenterology**. **Professor Beattie** will take up his new post in September 2018. *bmj.com/company*