UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AMAZON.COM, INC.,
AMAZON.COM SERVICES LLC,
AMAZON WEB SERVICES, INC., and
AUDIBLE, INC.,
Petitioners

v.

AUDIO POD IP, LLC,
Patent Owners

Case No. IPR2025-00768
Patent 10,805,111

DECLARATION OF SYLVIA D. HALL-ELLIS, Ph.D.

Amazon v. Audio Pod
US Patent 10,805,111
Amazon EX-1097

I. INTRODUCTION

I, Sylvia D. Hall-Ellis, hereby declare:

1. I have been retained as an expert by Amazon.com, Inc., Amazon.com Services LLC, Amazon Web Services, Inc., and Audible, Inc. (referred to herein as "Petitioners").

2. I have written this declaration at the request of Petitioners to provide my expert opinion regarding the authenticity and public availability of several publications. My declaration sets forth my opinions in detail and provides the basis for my opinions regarding the public availability of these publications.

3. I reserve the right to supplement or amend my opinions, and bases for them, in response to any additional evidence, testimony, discovery, argument, and/or other additional information that may be provided to me after the date of this declaration.

4. I am being compensated for my time spent working on this matter at my normal consulting rate, plus reimbursement for any additional reasonable expenses. My compensation is not in any way tied to the content of this declaration, the substance of my opinions, or the outcome of this proceeding. I have no other interests in this proceeding or with any of the parties.

5. All of the materials that I considered are discussed explicitly in this declaration.

II. QUALIFICATIONS

6. I am currently an Adjunct Professor in the School of Information at San José State University. I obtained a Master of Library Science from the University of North Texas in 1972 and a Ph.D. in Library Science from the University of Pittsburgh in 1985. Over the last fifty years, I have held various positions in the field of library and information resources. I was first employed as a librarian in 1966 and have been involved in the field of library sciences since, holding numerous positions.

7. I am a member of the American Library Association ("ALA") and its Association for Library Collections & Technical Services ("ALCTS") Division, and I served on the Committee on Cataloging: Resource and Description (which wrote the new cataloging rules) and as the chair of the Committee for Education and Training of Catalogers and the Competencies and Education for a Career in Cataloging Interest Group. I also served as the Chair of the ALCTS Division's Task Force on Competencies and Education for a Career in Cataloging. Additionally, I served as the Chair for the ALA Office of Diversity's Committee on Diversity, as a member of the REFORMA National Board of Directors, and as a member of the Editorial Board for the ALCTS premier cataloging journal, *Library Resources and Technical Services,* as a Co-Chair of the Membership Committee for the Library Research Round Table (LRRT) of the American Library

Association, and as a member of the LRRT Nominating Committee. Currently I serve as a member of the CORE Margaret Mann Citation Committee.

8. I have also given over one-hundred presentations in the field, including several on library cataloging systems and Machine-Readable Cataloging ("MARC") standards. My current research interests include library cataloging systems, metadata, and organization of electronic resources.

9. My full *curriculum vitae* is attached hereto as Attachment 5 to this declaration.

III. PRELIMINARIES

10. I am not an attorney and will not offer opinions on the law. I am, however, rendering my expert opinion on the authenticity of the document referenced herein and on when and how each document was disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art, exercising reasonable diligence, could have located the document.

11. I understand that an item is considered authentic if there is sufficient evidence to support a finding that the item is what it is claimed to be. I also understand that authenticity can be established based on the contents of the documents themselves, such as the appearance, contents, substance, internal patterns, or other distinctive characteristics of the item, taken together with all of

the circumstances. I further understand that an item is considered authentic if it is at least 20 years old, in a condition that creates no suspicion of its authenticity, and in a place where, if authentic, it would likely be. Lastly, I understand that a document's authenticity can be established by comparison with an authentic specimen.

12. I understand that a printed publication qualifies as publicly accessible as of the date it was disseminated or otherwise made available such that a person interested in and ordinarily skilled in the relevant subject matter could locate it through the exercise of reasonable diligence.

13. While I understand that the determination of public accessibility under the foregoing standard rests on a case-by-case analysis of the facts particular to an individual publication, I also understand that a printed publication may be rendered "publicly accessible" if it is cataloged and indexed by a library such that a person interested in the relevant subject matter, exercising reasonable diligence, could locate it (i.e., I understand that cataloging and indexing by a library may show public accessibility, though there are other ways that a printed publication may qualify as publicly accessible). I understand that the cataloging and indexing by a single library, even in a foreign country, of a single instance of a particular printed publication may show public accessibility. I understand that, even if access to a library is restricted, a printed publication that has been cataloged and indexed

therein may be publicly accessible so long as a presumption is raised that the portion of the public concerned with the relevant subject matter would know of the printed publication. I also understand that the cataloging and indexing of information that would guide a person interested in the relevant subject matter to the printed publication, such as the cataloging and indexing of an abstract for the printed publication, can show public accessibility.

14. I understand that routine business practices, such as general library cataloging and indexing practices, can be used to establish an approximate date on which a printed publication became publicly accessible.

IV. LIBRARY CATALOGING PRACTICES

15. In preparing this declaration, I used authoritative databases, such as the Online Computer Library Center (OCLC) bibliographic database, the Library of Congress Online Catalog, and the Library of Congress Subject Authorities, to confirm citation details of the publications discussed below. It is my opinion that this standard cataloging and classification protocol was followed for the publications discussed below.

16. Based on my experience working in research libraries, it is my opinion that members of the public would have been able to locate the material discussed herein on their own or with the assistance of a research librarian with relative ease using the tools and resources described herein.

A. INDEXING

17. A researcher may discover material relevant to his or her topic in a variety of ways. One common means of discovery is to search for relevant information in an index of periodical and other publications. Having found relevant material, the researcher will then normally obtain it online, look for it in libraries, or purchase it from the publisher, a bookstore, a document delivery service, or other provider. Sometimes, the date of a document's public accessibility will involve both indexing and library date information. However, date information for indexing entries is often unavailable. This is especially true for online indices.

18. Indexing services use a wide variety of controlled vocabularies to provide subject access and other means of discovering the content of documents. The formats in which these access terms are presented vary from service to service.

19. Before the widespread development of online databases to index articles in journals, magazines, conference papers, and technical reports, libraries purchased printed volumes of indices. Graduate library school education mandated that students learn about the bibliographic control of disciplines, the prominent indexing volumes, and searching strategies required to use them effectively and efficiently. Half of the courses that I studied in library school were focused on the bibliography and resources in academic disciplines.

20. Librarians consulted with information seekers to verify citations, check availability in union catalogs, printed books catalogs, and the OCLC database, and make formal requests for materials, *e.g.*, books, conference proceedings, journal articles. Requests were transmitted using Telex machines, rudimentary email systems, and the United States Postal Service. During my career, I have performed and supervised staff who handled these resource sharing tasks.

21. A major firm known for the breadth of subjects and comprehensive treatment in the preparation of index volumes, the H. W. Wilson Company offered these reference resources since the firm was founded in 1898. The *Reader's Guide to Periodical Literature* is one of the best-known titles available from H. W. Wilson. Each volume includes a comprehensive index for 300 of the most popular and important periodicals published in the United States and Canada. Information seekers have subject access expressed in plain language terminology, author access, and cross references to find the desired results from their searches. The family of index titles included *Science & Technology Index, Business Periodicals, Applied Science & Technology Index, Humanities Index, Biological & Agricultural Index,* and *Industrial Arts Index*. These printed indices have been superseded by digital database offerings available to information seekers through Ebsco.

22. Online indexing services commonly provide bibliographic information, abstracts, and full-text copies of the indexed publications, along with a list of the documents cited in the indexed publication. These services also often provide lists of publications that cite a given document. A citation of a document is evidence that the document was publicly available and in use no later than the publication date of the citing document.

23. *ResearchGate*.[1] A social networking site designed for scientists and researchers to share papers, ask and answer questions, and find collaborators, *ResearchGate* is the largest academic social network in terms of active users. As of September 2023, ResearchGate had more than 25 million users, with its largest user-bases coming from Europe and North America.[2]

24. Features available to *ResearchGate* members include following a research interest and the work of other individual participants, a blogging feature for users to write short reviews on peer-reviewed articles, private chat rooms for sharing data, editing documents, or discussing confidential topics, and a research-focused job board. *ResearchGate* indexes self-published information on user profiles and suggests members connect with others who have similar

[1] www.researchgate.net

[2] https://en.wikipedia.org/wiki/ResearchGate

interests. Member questions are fielded to others who have identified relevant expertise on their profiles.

25. *ResearchGate* restricts its user accounts to people at recognized institutions and published researchers. Most of *ResearchGate's* users are involved in medicine, biology, engineering, computer science, agricultural sciences, and psychology. *ResearchGate* publishes a citation impact measurement in the form of an "RG Score," which is reported to be correlated with existing citation impact measures. *ResearchGate* does not charge fees for putting content on the site and does not require peer review.

26. *Semantic Scholar.*[3] A project developed at the Allen Institute for Artificial Intelligence and publicly released in November 2015, *Semantic Scholar* is designed to be an AI-backed search engine for scientific journal articles which uses a combination of machine learning, natural language processing, and machine vision to add a layer of semantic analysis to the traditional methods of citation analysis, and to extract relevant figures, entities, and venues from papers. *Semantic Scholar* is designed to highlight important, influential papers, and to identify the connections between them.

27. As of January 2018, following a 2017 project that added biomedical papers and topic summaries, the *Semantic Scholar* corpus included more than 40

[3] https://www.semanticscholar.org

million papers from computer science and biomedicine. In March 2018, Doug Raymond, who developed machine learning initiatives for the Amazon Alexa platform, was hired to lead the *Semantic Scholar* project. As of August 2019, the number of included papers had grown to more than 173 million after the addition of the Microsoft Academic Graph records, already used by Lens.org.

28. *IEEE Xplore.* Librarians in academic, special, and large public libraries are familiar with the *IEEE Xplore* database. In working with undergraduate and graduate students, researchers, scientists, and the public, librarians are intimately familiar with the *IEEE Xplore* database and rely on its content for access to reliable, accurate publications. Established to serve as a database for the IEEE's ebooks, standards, conference papers, technical reports, and journal articles, and related documents dating from 1988 to the present and selectively from 1913 to 1987, *IEEE Xplore* is a scholarly research database that includes 6.6 million documents which is known for its reputable curation and maintenance of documents and publication information. The *IEEE Xplore* database accurately reports dates of publications and events and accurately reports locations of events in accordance with standard practices for major industry journals. Approximately 20,000 new documents are added to *IEEE Xplore* each month. Abstracts are free to access, but access to full text requires a subscription or institutional login.

29. The *IEEE Xplore* database requires peer review before publishing content. I have used IEEE publications in print and online for nearly 50 years. Currently I have access to IEEE documents as part of the resources for faculty through the King Library at San José State University. In addition to covering material from the IEEE, the *IEEE Xplore* also covers materials from the Institution of Engineering and Technology. The *IEEE Xplore* digital library provides Web access to more than 6.6-million full-text documents from some of the world's most highly cited publications. Approximately 20,000 new documents are added to *IEEE Xplore* each month. Abstracts are free to access, but access to full text requires a subscription or institutional login.

30. *WayBack Machine.* The *WayBack Machine* is an application using a crawler created by the Internet Archive to search its archive of Web page URLs and to represent, graphically, the date of each crawler capture. The Internet Archive is a non-profit digital library founded in 1996 that maintains an archive of webpages collected from the Internet using software called a crawler. Crawlers automatically create a snapshot of webpages as they existed at a certain point in time. The Internet Archive captures data that is publicly available. Some sites are "not archived because they were password protected, blocked by robots.txt, or otherwise inaccessible to our automated systems. Site owners might have also requested that their sites be excluded from the WayBack Machine."

31. As of January 1, 2023, the Internet Archive holds more than 38 million print materials, 11.6 million pieces of audiovisual content, 2.6 million software programs, 15 million audio files, 4.7 million images, 251,000 concerts, and over 832 billion web pages in its *Wayback Machine.*[4]

32. Many Internet Archive captures made by the *WayBack Machine* have a banner at the top with the capture date prominently displayed. Other dates when captures of the same URL have been made are indicated to the right and left of the date provided in the banner. Some captures may lack this banner. In any case, the URL for the capture begins with the identification of the Internet Archive page (e.g., http://web.archive.org/web/) followed by information that dates and time stamps the capture as follows: year in yyyy, month in mm, day in dd, time code in hh:mm:ss (e.g., 20071120082013, or November 20, 2007 at 8:20:13 a.m.). These elements are then followed by the URL of the original capture site. When links are active, the *WayBack Machine* is programed to produce the archived file with the closest available date (not the closest available prior date) to the page upon which the link appeared and was clicked. I and other librarian professionals are familiar with the Internet Archive and the *Wayback Machine*.[5]

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[4] https://en.wikipedia.org/wiki/Internet_Archive

[5] For more information about the Internet Archive see the WayBack Machine FAQ, https://archive.org/about/faqs.php#The_Wayback_Machine.

B. MARC RECORDS AND THE ONLINE LIBRARY CATALOG

33. I am fully familiar with the library cataloging standard known as the MARC standard, which is an industry-wide standard method of storing and organizing library catalog information.[6] MARC was first developed in the 1960s by the Library of Congress. A MARC-compatible library is one that has a catalog consisting of individual MARC records for each of its items. Today, MARC is the primary communications protocol for the transfer and storage of bibliographic metadata in libraries.[7]

34. MARC is a framework into which descriptive bibliographic data are transcribed to interact with the software in online library catalogs to provide access to books, journals, and other resources in the collection. The bibliographic data

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[6] The full text of the standard is available from the Library of Congress at http://www.loc.gov/marc/bibliographic/.

[7] Almost every major library in the world is MARC-compatible. *See, e.g.*, *MARC Frequently Asked Questions (FAQ)*, Library of Congress, https://www.loc.gov/marc/faq.html (last visited February 17, 2025) ("MARC is the acronym for MAchine-Readable Cataloging. It defines a data format that emerged from a Library of Congress-led initiative that began nearly forty years ago. It provides the mechanism by which computers exchange, use, and interpret bibliographic information, and its data elements make up the foundation of most library catalogs used today."). MARC is the ANSI/NISO Z39.2-1994 (reaffirmed 2016) standard for Information Interchange Format.

provide points of access and can be searched by a person of ordinary skill in the art ("POSITA") to identify and obtain resources in the library collection. An information seeker (or POSITA) can search a local online library catalog or the holdings of a group of libraries in a state or region or in the global catalog WorldCat.

35. MARC records are not designed for public viewing. Although a significant number of libraries provide access to the MARC version of a bibliographic record, the public display is designed to show information in a succinct manner that is quickly understood and useful to the information seeker. Libraries determine the default search for the online catalog to make the entry of search terms efficient and result in a successful search. Information seekers can enter a keyword, title, author, or standard number for the item. Libraries may also provide a search capability called "Summon" that allows the information seeker to enter known information about the item to conduct a search.

36. Since at least the early 1970s and continuing to the present day, MARC has been the primary communications protocol for the transfer and storage of bibliographic metadata in libraries.[8] As explained by the Library of Congress:

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[8] A complete history of the development of MARC can be found in *MARC: Its History and Implications* by Henrietta D. Avram (Washington, DC: Library of Congress, 1975) and available online from the Hathi Trust

> You could devise your own method of organizing the bibliographic information, but you would be isolating your library, limiting its options, and creating much more work for yourself. Using the MARC standard prevents duplication of work and allows libraries to better share bibliographic resources. Choosing to use MARC enables libraries to acquire cataloging data that is predictable and reliable. If a library were to develop a "home-grown" system that did not use MARC records, it would not be taking advantage of an industry-wide standard whose primary purpose is to foster communication of information.
>
> Using the MARC standard also enables libraries to make use of commercially available library automation systems to manage library operations. Many systems are available for libraries of all sizes and are designed to work with the MARC format. Systems are maintained and improved by the vendor so that libraries can benefit from the latest advances in computer technology. The MARC standard also allows libraries to replace one system with another with the assurance that their data will still be compatible.

Why Is a MARC Record Necessary? LIBRARY OF CONGRESS, http://www.loc.gov/marc/umb/um01to06.html#part2 (last visited February 17, 2025).

(https://babel.hathitrust.org/cgi/pt?id=mdp.39015034388556;view=1up;seq=1; last visited February 17, 2025).

37. Examining the MARC records for a specific item reveals the comprehensive data transcribed about a particular item at the time that cataloging and classification occurred. In addition to the creator, title, subjects, and standard numbers, additional information may provide additional and relevant data depending on the type of resource. Understanding the full extent of bibliographic data for an item and the points of access associated with it provides essential information that can be used to determine the indexing and public availability for documents described in this Declaration.

1. MARC RECORDS

38. A MARC record comprises several fields, each of which contains specific data about the work. Each field is identified by a standardized, unique, three-digit code corresponding to the type of data that follow. For example, a work's title is recorded in field 245, the primary author or creator of the work is recorded in field 100, an item's International Standard Book Number ("ISBN") is recorded in field 020, an item's International Standard Serial Number ("ISSN") is recorded in field 022, an item's Library of Congress call number is recorded in field 050, and the publication date is recorded in field 260 under the subfield "c." *Id.*[9] If a work is a periodical, then its publication frequency is recorded in field

[9] In some MARC records, field 264 is used rather than field 260 to record publication information. *See* http://www.loc.gov/marc/bibliographic/bd264.html

310, alternate publication frequency is recorded in field 321, and the publication dates (*e.g.*, the first and last publication) are recorded in field 362, which is also referred to as the enumeration/chronology field. *See* http://www.loc.gov/marc/bibliographic/bd3xx.html (last visited February 17, 2025).

39. The library that created the record is recorded in Field 040 in subfield "a" with a unique library code. When viewing the MARC record online via Online Computer Library Center's ("OCLC") bibliographic database, hovering over this code with the mouse reveals the full name of the library. I used this method of "mousing over" the library codes in the OCLC database to identify the originating library for the MARC records discussed in this Declaration. Where this "mouse over" option was not available, I consulted the Directory of OCLC Libraries to identify the institution that created the MARC record.[10]

40. MARC records also include several fields that include subject matter classification information. An overview of MARC record fields is available through the Library of Congress at http://www.loc.gov/marc/bibliographic/. For

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(last visited February 17, 2025) ("Information in field 264 is similar to information in field 260 (Publication, Distribution, etc. (Imprint)). Field 264 is useful for cases where the content standard or institutional policies make a distinction between functions").

[10] https://www.oclc.org/en/contacts/libraries.html

example, 6XX fields are termed "Subject Access Fields." *See* http://www.loc.gov/marc/bibliographic/bd6xx.html. Among these, for example, is the 650 field; this is the "Subject Added Entry – Topical Term" field. *See* http://www.loc.gov/marc/bibliographic/bd650.html. The 650 field is a "[s]ubject added entry in which the entry element is a topical term." *Id.* These authenticated subject entries "are assigned to a bibliographic record to provide access according to generally accepted thesaurus-building rules (*e.g.*, *Library of Congress Subject Headings* (LCSH), *Medical Subject Headings* (MeSH))." *Id.*

41. Further, MARC records include call numbers, which themselves indicate a subject and physical location within the library collections. For example, the 050 field is the "Library of Congress Call Number." *See* http://www.loc.gov/marc/bibliographic/bd050.html (last visited February 17, 2025). A defined portion of the Library of Congress Call Number is the classification number, and "source of the classification number is *Library of Congress Classification* and the *LC Classification-Additions and Changes*." *Id.* Thus, included in the 050 field is a subject matter classification. Each item in a library has a single classification number. A library selects a classification scheme (*e.g.*, the Library of Congress Classification scheme just described or a similar scheme such as the Dewey Decimal Classification scheme or the National Library of Medicine Classification scheme) and uses it consistently. When the Library of

Congress assigns the classification number, it appears as part of the 050 field. If a local library assigns the classification number, it appears in a 090 field. In either scenario, the MARC record includes a classification number that represents a subject matter classification.

42. Each item in a library has a single classification number. A library selects a classification scheme (*e.g.*, the Library of Congress Classification scheme just described or a similar scheme such as the Dewey Decimal Classification scheme) and uses it consistently. When the Library of Congress assigns the classification number, it appears as part of the 050 field, as discussed above. For MARC records created by libraries other than the Library of Congress (*e.g.*, a university library or a local public library), the classification number may appear in a 09X (*e.g.*, 090) field. *See* http://www.loc.gov/marc/bibliographic/bd09x.html (last visited February 17, 2025).

2. OCLC

43. The OCLC was created "to establish, maintain and operate a computerized library network and to promote the evolution of library use, of libraries themselves, and of librarianship, and to provide processes and products for the benefit of library users and libraries, including such objectives as increasing availability of library resources to individual library patrons and reducing the rate of rise of library per-unit costs, all for the fundamental public purpose of furthering

ease of access to and use of the ever-expanding body of worldwide scientific, literary and educational knowledge and information."[11] Among other services, OCLC and its members are responsible for maintaining the WorldCat database (http://www.worldcat.org/), used by independent and institutional libraries throughout the world.

44. OCLC also provides its members online access to MARC records through its OCLC bibliographic database. When an OCLC member institution acquires a work, it creates a MARC record for this work in its computer catalog system in the ordinary course of its business. MARC records created at the Library of Congress were initially tape-loaded into the OCLC database through a subscription to MARC Distribution Services daily or weekly. Once the MARC record is created by a cataloger at an OCLC member institution or is tape-loaded from the Library of Congress, the MARC record is then made available to any other OCLC members online, and therefore made available to the public. Accordingly, once the MARC record is created by a cataloger at an OCLC member institution or is tape-loaded from the Library of Congress or another library anywhere in the world, any publication corresponding to the MARC record has

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[11] Third Article, Amended Articles of Incorporation of OCLC Online Computer Library Center, Incorporated (available at https://www.oclc.org/content/dam/oclc/membership/articles-of-incorporation.pdf).

been cataloged and indexed according to its subject matter such that a person interested in that subject matter could, with reasonable diligence, locate and access the publication through any library with access to the OCLC bibliographic database or through the Library of Congress.

45. When an OCLC member institution creates a new MARC record, OCLC automatically supplies the date of creation for that record. The date of creation for the MARC record appears in the fixed field (008), characters 00 through 05. The MARC record creation date reflects the date on which, the item was first acquired or cataloged. Initially, field 005 of the MARC record is automatically populated with the date the MARC record was created in year, month, day format (YYYYMMDD) (some of the newer library catalog systems also include hour, minute, second (HHMMSS)). Thereafter, the library's computer system may automatically update the date in field 005 every time the library updates the MARC record (*e.g.*, to reflect that an item has been moved to a different shelving location within the library). Field 005 is visible when viewing a MARC record via an appropriate computerized interface. The initial field 005 date (*i.e.*, the date the MARC record was created) does appear. The date upon which the most recent update to field 005 occurred also appears in field 005. Thus, when an item's MARC record has been printed to hardcopy—as is the case with the

exhibits to this report—the date reflected next to field 008 is necessarily on or after the date the library first cataloged and indexed the underlying item.

46. Once one library has cataloged and indexed a publication by creating a MARC record for that publication, other libraries that receive the publication do not create additional MARC records—the other libraries instead rely on the original MARC record. They may update or revise the MARC record to ensure accuracy, but they do not replace or duplicate it. This practice does more than save libraries from duplicating labor, it also enhances the accuracy of MARC records. It also allows librarians around the world to know that a particular MARC record is authoritative. In contrast, a hypothetical system wherein duplicative records were created would result in confusion as to which record is authoritative.

47. The date of creation of the MARC record by a cataloger at an OCLC member institution reflects when the underlying item is accessible to the public. Upwards of two-thirds to three-quarters of book sales to libraries come from a jobber or wholesaler for online and print resources. These resellers make it their business to provide books to their customers as fast as possible, often providing turnaround times of only a single day after publication. Libraries purchase a significant portion of the balance of their books directly from publishers themselves, which provide delivery on a similarly expedited schedule. In general, libraries make these purchases throughout the year as the books are published and

shelve the books as soon thereafter as possible in order to make the books available to their patrons. Thus, books are generally available at libraries across the country within just a few days of publication.

C. JOURNALS

48. Catalogers can create MARC records for all types of print, online, and digital resources. For example, MARC records cover serial publications, including both serially-published monographs and journals. OCLC hosts MARC records for more than 320 million serial publications. Serial publications are those publications that have the same collective title but are intended to be continued indefinitely with enumeration such as a volume or issue number (*e.g.*, magazines, journals, etc.). In the OCLC bibliographic database, the first issue of the serial publication is typically cataloged (*i.e.*, a corresponding MARC record is created), but the date is left open-ended with the use of a punctuation mark such as a dash. OCLC serial publication MARC records represent the entire run of the serial title. With knowledge of the first issue published, future issues can be predicted based on the information provided in the MARC record, for example in field 362. In my extensive professional experience, is it highly unusual for a library to stop collecting and shelving a serial publication prior to the end of its publication run. If a subscription to a serial publication ends its run or is cancelled before the end of its run, the library will denote that it has stopped receiving new volumes by filling

in the end date in the MARC record.

49. The handling of printed journal subscriptions is shown on the cover or the first few pages of individual issues. As was the best practice among libraries, issues arrived at a central facility and were immediately received, verified as part of a subscription, checked in, and stamped or labeled with the institution's name and date. Determining that the issue was part of the library subscription ensured that the entire set of publications for the year had been received so that they could be professionally bound and retained. This process also verified that all of the published issues arrived so that the library staff did not have to request or claim an issue that did not arrive as expected. In large public libraries with branches and multi-campus libraries within academic institutions, the journals were sorted and delivered to the subscribing unit. The new issue was placed in the public area; the older issue was stored so that it remained available.

50. The foregoing process has been standard library practice longer than I have been working in the profession. I first learned the steps in the process in the late 1970s and later supervised it. Although the checking in process has become automated and now links electronically to holdings records for the MARC record for each serial title, the manual placement of a stamp or label and placing the issue in a public area has not changed for 50 years. Unless I note otherwise below in reference to a specific serial publication, it is my expert opinion that this standard

protocol was followed for the serial publication discussed below.

V. PUBLICATIONS

A. "Multimedia Synchronization" by B. Prabhakaran [Exhibit 1026]

51. Attached hereto as Attachment 6 is a copy of an excerpt from the book titled *Multimedia Systems and Techniques* edited by Borko Furht and issued by Kluwer Academic Press in 1996. The excerpt is Chapter 6, "Multimedia Synchronization" by B. Prabhakaran (hereafter "Prabhakaran") which appears on pages 177-216. Attachment 6 is a true and correct copy of the title page, copyright page, table of contents, and Chapter 6 as held by the Indiana University Libraries (Bloomington, Indiana). I obtained Attachment 6 from the Indiana University Libraries. The text in Attachment 6 is complete; no pages are missing from the excerpts, and the text on each page of the excerpts appears to flow seamlessly from one page to the next; further, there are no visible alterations to the document. Attachment 6 is a true and correct copy in a condition that creates no suspicion about its authenticity. I have reviewed Exhibit 1026 of the concurrently filed petition and Attachment 6, and, based on this review, Exhibit 1026 is a true and correct copy of Prabhakaran.

52. Attached hereto as Attachment 1A is a true and correct copy of the MARC record for this monograph from the Indiana University Libraries online catalog. The library ownership is indicated by the presence of the library's code

("IUL") in the 049 field. The book titled *Multimedia Systems and Techniques* was cataloged on March 11, 1996, as indicated in field 998, subfield c ("3/11/1996"). I personally identified and retrieved the library catalog record which is Attachment 1A.

53. Attached hereto as Attachment 1B is a true and correct copy of the MARC record for the book titled *Multimedia Systems and Techniques* obtained from the OCLC bibliographic database. I personally identified and retrieved the MARC record that is Attachment 1B. As previously noted, the library that created the record is recorded in field 040 with a unique library code. For Attachment 1B, that library code is "DLC," which means that the MARC record for this book was created at the Library of Congress as part of the Cataloging in Publication (CIP) Program.[12] A cataloger prepares basic information about the forthcoming book which is included on the verso of the title page (also called the copyright page). The information is provided to save time needed for the cataloging process at the library after the book is purchased. The CIP data includes the author (field 100), title and subtitle (field 245), ISBN (field 022), suggested subject headings (field 650), classification numbers for the Library of Congress classification number (field 050), and the Dewey Decimal classification number (field 082). These data elements are included in the MARC record that the Library of Congress

[12] https://www.loc.gov/publish/cip/

contributes to the OCLC bibliographic database. As can be seen in field 008 ("Date entered on file") in the MARC record for this exhibit, a cataloger at the Library of Congress created OCLC record number 33665840 on October 31, 1995 ("951031"). The library continues to update and enhance this MARC record to meet current cataloging rules. The most recent enhancement to Attachment 1B occurred on July 26, 2024, as shown in field 005 ("20240726"). I personally identified and retrieved the MARC record that is Attachment 1B.

54. Attachment 1B further includes an entry in field 050 ("QA76.575 $b .M852 1996")—as described above, this includes a subject matter classification number consistent with the Library of Congress classification system (analogous to the Dewey Decimal classification system) and an entry in field 082 ("006.6"), a subject matter consistent with the Dewey Decimal classification system. Attachment 1B further includes a descriptor term reading "Multimedia systems" (see Attachment 1C, Library of Congress subject heading sh92002381) in the 650 field. Thus, as of its cataloging, the publication corresponding to the MARC record attached hereto as Attachment 1B was indexed according to its subject matter by virtue of at least three independent classifications: the field 050 entry, the field 082 entry, and the field 650 entry. Further, as of October 31, 1995, the MARC record attached hereto as Attachment 1B was accessible through any library with access to the OCLC bibliographic database or the online catalog at a

library that added this book to its collection, which means that the corresponding publication was publicly available on or before that same date through any library with access to the OCLC bibliographic database or through an individual library.

55. Further supporting my opinion that Exhibit 1026 was publicly accessible to ordinarily skilled and interested researchers in the field is the fact that the book titled *Multimedia Systems and Techniques* was registered with the U. S. Copyright Office as item TX0004254747 on April 5, 1996, and indicated a publication date of January 23, 1996 (see Attachment 1D, U.S. Copyright Office Public Catalog). As noted above, this would have provided a POSITA with keyword searching capabilities and other tools to locate this book.

56. WorldCat indicates that the book titled *Multimedia Systems and Techniques* as cataloged at the Library of Congress is currently available from 239 libraries.[13] In view of above, the book titled *Multimedia Systems and Techniques* was publicly available on or shortly after March 11, 1996, because by that date it had been cataloged and indexed at the Library of Congress, made part of the OCLC bibliographic database, and received in the Indiana University Libraries. For these reasons, it is my opinion that Exhibit 1026 was published and accessible to the public on or shortly after March 11, 1996.

[13] https://search.worldcat.org/title/33665840

B. "Accessing Smil-Based Dynamically Adaptable Multimedia Presentations from Mobile Devices" by Robert Steele, Marcin Lubonski, Yuri Ventsov, and Elaine Lawrence [Exhibit 1029]

57. Attached hereto as Attachment 7 is a copy of a conference paper published in the two-volume set titled *ITCC 2004: International Conference on Information Technology: Coding and Computing Proceedings* found in the Linda Hall Library of Science, Engineering & Technology (Kansas City, Missouri). The conference paper titled "Accessing Smil-Based Dynamically Adaptable Multimedia Presentations from Mobile Devices" by Robert Steele, Marcin Lubonski, Yuri Ventsov, and Elaine Lawrence (hereafter "Steele") appears beginning on page 410 in volume 2. The International Conference on Information Technology: Coding and Computing (also known as ITCC '04) was held on April 5-7, 2004, in Las Vegas, Nevada. Attachment 7 is a true and correct copy of the Steele conference paper (volume 2, pages 410-414). I obtained this copy of the conference paper from the Linda Hall Library of Science, Engineering & Technology. Specifically, the text of the Steele conference paper is complete; no pages are missing, and the text on each page appears to flow seamlessly from one page to the next; further, there are no visible alterations to the document. Attachment 7 was found within the custody of a library – a place where, if authentic, a copy of this conference proceedings two-volume set would likely be. Attachment 7 is a true and correct copy in a condition that creates no

suspicion about authenticity. I have reviewed Exhibit 1029 of the concurrently filed petition and Attachment 7, and, based on this review, Exhibit 1029 is a true and correct copy of the Steele paper.

58. The Steele conference paper is available in the *IEEE Xplore* database,[14] the *ACM Digital Library*,[15] and the digital repository *ResearchGate*.[16] The Steele conference paper was added to the *IEEE Xplore* database on August 24, 2004.

59. Attached hereto as Attachment 2A is a true and correct copy of the MARC record for this conference proceedings two-volume set from the Linda Hall Library of Science, Engineering & Technology online catalog. The library ownership is indicated by the presence of the library's code ("LHL") in field 049. I personally identified and retrieved the library catalog record which is Attachment 2A.

60. Based on finding a digital copy of the Steele paper in the Linda Hall Library of Science, Engineering & Technology and MARC record in its online library catalog attached as Attachment 2A, it is my opinion that the Steele

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[14] https://ieeexplore.ieee.org/document/1286676

[15] https://dl.acm.org/doi/abs/10.5555/977403.978438

[16] https://www.researchgate.net/publication/4068193_Accessing_SMIL-based_dynamically_adaptable_multimedia_presentations_from_mobile_devices

conference paper was publicly available as of August 24, 2004, as shown on the *IEEE Xplore* website.

61. Attached hereto as Attachment 2B is a true and correct copy of the MARC record for the two-volume set titled *ITCC 2004: International Conference on Information Technology: Coding and Computing Proceedings* obtained from the OCLC bibliographic database. I personally identified and retrieved the MARC record that is Attachment 2B. As previously noted, the library that created the record is recorded in field 040 with a unique library code. For Attachment 2B, that library code is "DLC," which means that the MARC record for this conference proceedings two-volume set was created at the Library of Congress. As can be seen in field 008 ("Date entered on file") in the MARC record for this exhibit, a cataloger at the Library of Congress created OCLC record number 54981135 on February 10, 2004 ("040210"). The library continues to update and enhance the MARC record to meet current cataloging rules. The most recent enhancement occurred on November 6, 2024, as shown in field 005 ("20241106").

62. Attachment 2B further includes an entry in field 050 ("QA76.575 $b .I27 2004")—as described above, a subject matter classification number consistent with the Library of Congress classification system (analogous to the Dewey Decimal classification system) and an entry in field 082 ("006.7")—as described above, a subject matter classification number consistent with the Dewey Decimal

classification system. Attachment 2B also shows that Attachment 7 was catalogued with four descriptor terms reading "Multimedia systems $v Congresses" (see Attachment 2C, Library of Congress subject heading sh2008107510), "Information technology $v Congresses" (see Attachment 2D, Library of Congress subject heading sh2008104441), "Computer networks $v Congresses" (Attachment 2E, Library of Congress subject heading sh2008101222), and "Coding theory $v Congresses" (Attachment 2F, Library of Congress subject heading sh2008101156) in the 650 fields. Thus, as of its cataloging, the publication corresponding to the MARC record attached hereto as Attachment 2B was indexed according to its subject matter by virtue of at least three independently sufficient classifications: the field 050 entry, the field 082 entry, and the field 650 entries. Further, as of February 10, 2004, the MARC record attached hereto as Attachment 2B was accessible through any library with access to the OCLC bibliographic database or the online catalog at a library that acquired the conference proceedings volume, which means that the corresponding publication was publicly available on or before that same date through any library with access to the OCLC bibliographic database or through an individual library.

63. Further supporting my opinion that the Steele paper was publicly accessible to ordinarily skilled and interested researchers in the field is the fact that the two-volume set titled *ITCC 2004: International Conference on Information*

Technology: Coding and Computing Proceedings was registered with the U. S. Copyright Office as item TX0006109714 on February 7, 2005, and indicated a publication date of April 5, 2004 (see Attachment 2G, U.S. Copyright Office Public Catalog). As noted above, this would have provided a POSITA with keyword searching capabilities and other tools to locate this book.

64. WorldCat indicates that the two-volume set titled *ITCC 2004: International Conference on Information Technology: Coding and Computing Proceedings* as cataloged at the Library of Congress is currently available from 321 libraries.[17] In view of the above, the two-volume set titled *ITCC 2004: International Conference on Information Technology: Coding and Computing Proceedings* was publicly available on or shortly after August 24, 2004, because by that date it had been cataloged and indexed at the Library of Congress, made part of the OCLC bibliographic database, and added to the *IEEE Xplore* database. For these reasons, it is my opinion that the Steele paper was published and publicly accessible on or shortly after August 24, 2004.

C. *Specifications for the Digital Talking Book: an American National Standard* developed by the National Information Standards Organization. [Exhibit 1003]

65. Exhibit 1003 of the concurrently filed petition is a true and accurate copy of the *Specifications for the Digital Talking Book: an American National*

[17] https://search.worldcat.org/title/54981135

Standard developed by the National Information Standards Organization (hereafter "ANSI/NISO Z39.86-2002"). I searched for this document on the Internet and downloaded it from the American National Institute of Standards (ANSI) webstore.[18] Exhibit 1003 accurately reflects the contents of the above website link and has not been changed or altered in any way—the text of the ANSI document in Exhibit 1003 is complete; no pages are missing; and, further, there are no visible alterations to the document. I understand that the appearance, contents, substance, and distinctive characteristics of Exhibit 1003 create no suspicion about its authenticity. As such, it is my opinion that Exhibit 1003 is authentic.

66. I understand that prior to December 12, 2005, ANSI would have been known to persons of ordinary skill in the art as a non-profit organization that "administers and coordinates the U.S. voluntary standards and conformity assessment system" through close collaboration with industry and government stakeholders to identify and develop standards- and conformance-based solutions to national and global priorities.[19] Furthermore, I understand that persons of ordinary skill in the art would have reasonably considered this organization and its

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[18] https://webstore.ansi.org/standards/niso/ansinisoz39862002?srsltid=AfmBOorxj6JSQRXKS9Yta7LsFBEC07hKKqCVrfZGYh2oZITfTJwKQdWZ

[19] https://www.ansi.org/about/introduction

website – https://www.ansi.org/ – as reliable and useful sources of information for research, study, development, or design of standards. It is my opinion that the ANSI document is a reliable authority for research, study, development, or design of standards for digital talking books.

67. The Library of Congress issued a formal press release on March 19, 2002, to announce the adoption of the ANSI/NISO Z39.86-2002 document (see Attachment 3A). Following five years of national and global partner efforts, the standard was developed by the National Institute of Standards Organization (NISO) and adopted by ANSI on March 6, 2002 (see Exhibit 1003 page 1). Information in the Library of Congress press release included the NISO website from which the ANSI/NISO Z39.86-2002 document could be downloaded by clicking on the "pdf" or "html" tab. (see Attachment 3B). Based on information provided by web crawler protocols that capture snapshots of websites on the Internet, this web page was on available the Internet at least as of March 28, 2002, when the ANSI/NISO Z39.86-2002 document was posted at 7:08:48 p.m. (see Attachment 3B (archived URL timestamp of "20020328190848")). The ANSI/NISO Z39.86-2002 document was added and remains a part of the official Library of Congress *Sustainability of Digital Formats: Planning for Library of Congress Collections* website in the "Format Description Category" for digital talking book (DTB) (see Attachment 3C).

68. Attached hereto as Attachment 3D is a true and correct copy of the MARC record for the ANSI/NISO Z39.86-2002 document obtained from the OCLC bibliographic database. I personally identified and retrieved the MARC record that is Attachment 3D. As previously noted, the library that created the record is recorded in field 040 with a unique library code. For Attachment 3D, that library code is "CPV," which means that the MARC record for this document set was created at the City University of Hong Kong Library (Kowloon, Hong Kong). As can be seen in field 008 ("Date entered on file") in the MARC record for this exhibit, a cataloger at the City University of Hong Kong Library created OCLC record number 50902883 on October 30, 2002 ("021030"). The library continues to update and enhance the MARC record to meet current cataloging rules. The most recent enhancement occurred on December 10, 2024, as shown in field 005 ("20241210").

69. Attachment 3D further includes an entry in field 050 ("Z5347 $b .N38 2002")—as described above, a subject matter classification number consistent with the Library of Congress classification system (analogous to the Dewey Decimal classification system) and an entry in field 082 ("070.5/73")—as described above, a subject matter classification number consistent with the Dewey Decimal classification system. Attachment 3D also shows that Exhibit 1003 was catalogued with two descriptor terms reading "Talking books $x Standards" (see Attachment

3E, Library of Congress subject heading sh85132098 and Attachment 3F, Library of Congress subject heading sh85127314) and "Sound $x Recording and reproducing $x Digital techniques $x Standards" (Attachment 3G, Library of Congress subject heading sh98007202) in the 650 fields. Thus, as of its cataloging, the publication corresponding to the MARC record attached hereto as Attachment 3D was indexed according to its subject matter by virtue of at least three independent classifications: the field 050 entry, the field 082 entry, and the field 650 entries. Further, as of October 30, 2002, the MARC record attached hereto as Attachment 3D was accessible through any library with access to the OCLC bibliographic database or the online catalog at a library that acquired the conference proceedings volume, which means that the corresponding publication was publicly available on or before that same date through any library with access to the OCLC bibliographic database or through an individual library.

70. WorldCat indicates that the ANSI/NISO Z39.86-2002 document as cataloged at the City University of Hong Kong Library is currently available from 32 libraries.[20] In view of the above, the ANSI/NISO Z39.86-2002 document was publicly available on or shortly after March 19, 2002, because by that date it had been added to the NISO website. For these reasons, it is my opinion that Exhibit 1003 was published and publicly accessible on or shortly after March 19, 2002.

[20] https://search.worldcat.org/title/50902883

D. *The Cat in the Hat* by Dr. Seuss [Exhibit 1031]

71. Attached hereto as Attachment 8 is a copy of a book titled *The Cat in the Hat* by Dr. Seuss (hereafter "Seuss") found in the Denver Public Library (Denver, Colorado). I obtained this copy from the Denver Public Library. Specifically, the text of the Seuss book is complete; no pages are missing, and the text on each page appears to flow seamlessly from one page to the next; further, there are no visible alterations to the document. Attachment 8 was found within the custody of a library – a place where, if authentic, a copy of this book would likely be. Attachment 8 is a true and correct copy in a condition that creates no suspicion about authenticity. I have reviewed Exhibit 1031 of the concurrently filed petition and Attachment 8, and, based on this review, Exhibit 1031 is a true and correct copy of Seuss.

72. Attached hereto as Attachment 4A is a true and correct copy of the MARC record for this book from the Denver Public Library online catalog. The library ownership is indicated by the presence of the library's code ("DPL") in the first field 049. I personally identified and retrieved the library catalog record which is Attachment 4A.

73. Based on finding a copy of Attachment 8 in the Denver Public Library and MARC record in its online library catalog attached as Attachment 4A, it is my

opinion that the Seuss book was publicly available as of August 19, 1985, ("850819") as shown in field 008.

74. Attached hereto as Attachment 4B is a true and correct copy of the MARC record for the Seuss book titled *The Cat in the Hat* obtained from the OCLC bibliographic database. I personally identified and retrieved the MARC record that is Attachment 4B. As previously noted, the library that created the record is recorded in field 040 with a unique library code. For Attachment 4B, that library code is "DLC," which means that the MARC record for this conference proceedings two-volume set was created at the Library of Congress. As can be seen in field 008 ("Date entered on file") in the MARC record for this exhibit, a cataloger at the Library of Congress created OCLC record number 14064308 on August 19, 1985 ("850819"). The library continues to update and enhance the MARC record to meet current cataloging rules. The most recent enhancement occurred on December 13, 2024, as shown in field 005 ("20241213").

75. Attachment 4B further includes an entry in field 050 ("PZ8.3[$b].G276"")—as described above, a subject matter classification number consistent with the Library of Congress classification system (analogous to the Dewey Decimal classification system) and an entry in field 082 ("811")—as described above, a subject matter classification number consistent with the Dewey Decimal classification system. Attachment 4B also shows that Attachment 8 was

catalogued with seven descriptor terms reading “Cats $v Juvenile poetry” (see Attachment 4C, Library of Congress subject heading sh2009118570), “Siblings $v Juvenile poetry” (see Attachment 4D, Library of Congress subject heading sh85017225 and Attachment 4E, Library of Congress subject heading sh85071187), “Play $v Juvenile poetry” (Attachment 4F, Library of Congress subject heading sh85103365 and Attachment 4E, Library of Congress subject heading sh85071187), “Indoor games $v Juvenile poetry” (see Attachment 4G, Library of Congress subject heading sh85065782 and Attachment 4E, Library of Congress subject heading sh85071187), “Wit and humor, Juvenile” (see Attachment 4H, Library of Congress subject heading sh85147133), “Children’s poetry” (Attachment 4I, Library of Congress subject heading sh85023721), and “Children’s stories, American” (Attachment 4J, Library of Congress subject heading sh85023784) in the 650 fields. Thus, as of its cataloging, the publication corresponding to the MARC record attached hereto as Attachment 4B was indexed according to its subject matter by virtue of at least three independent classifications: the field 050 entry, the field 082 entry, and the field 650 entries. Further, as of August 19, 1985, the MARC record attached hereto as Attachment 4B was accessible through any library with access to the OCLC bibliographic database or the online catalog at a library that acquired the book, which means that the corresponding publication was publicly available on or before that same date

through any library with access to the OCLC bibliographic database or through an individual library.

76. Further supporting my opinion that Attachment 8 was publicly accessible to ordinarily skilled and interested researchers in the field is the fact that the book titled *The Cat in the Hat* was re-registered with the U. S. Copyright Office as item RE0000240391 on January 31, 1985, and indicated a publication date of February 28, 1957 (see Attachment 4K, U.S. Copyright Office Public Catalog). As noted above, this would have provided a POSITA with keyword searching capabilities and other tools to locate this book.

77. WorldCat indicates that the book titled *The Cat in the Hat* as cataloged at the Library of Congress is currently available from 5,449 libraries.[21] In view of the above, the book titled *The Cat in the Hat* was publicly available in 1957, and no later than August 19, 1985 or shortly thereafter , because by that date it had been cataloged and indexed at the Library of Congress and made part of the OCLC bibliographic database. For these reasons, it is my opinion that Seuss was published and publicly accessible on or shortly after August 19, 1985.

[21] https://search.worldcat.org/title/14064308

VI. SUMMARY OF OPINIONS

78. In view of the foregoing, it is my opinion that the publications described above were publicly available no later than the corresponding date listed in the table below:

Exhibit	Publication	Publicly Available On or After
1026	Prabhakaran, B. Chapter 6, "Multimedia Synchronization." In *Multimedia Systems and Techniques* (pp. 177-216) edited by Borko Furht. Boston, MA: Kluwer Academic, c1996.	March 11, 1996
1029	Steele, Robert, Marcin Lubonski, Yuri Ventsov, and Elaine Lawrence. "Accessing Smil-Based Dynamically Adaptable Multimedia Presentations From Mobile Devices." *ITCC 2004: International Conference on Information Technology: Coding and Computing Proceedings* (vol. 2, pp. 410-414). ITCC '04. 2 vols. Piscataway, NJ: IEEE, 2004.	August 24, 2004
1003	National Information Standards Organization (U.S.) *Specifications for the digital talking book: an American national standard.* ANSI/NISO Z39.86-2002. National information standards series. Bethesda, MD: NISO Press, 2002.	March 19, 2002
1031	Seuss, Dr. *The Cat in the Hat.* New York: Random House, 1957.	August 19, 1985

In signing this Declaration, I recognize that the Declaration will be filed as evidence in a case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Date: March 20, 2025

Sylvia D. Hall-Ellis, Ph.D.

ATTACHMENT 1A

LEADER 00000cam a22000008a 45 0
001 734098
008 951031s1996 maua b 001 0 eng||
010 a| 95047658
020 a| 0792396839 (alk. paper)
035 a| (Sirsi)734098
035 a| (InU)AGD8557BB
035 a| (OCoLC)ocm33665840
040 a| DLC c| DLC
049 a| IULA
050 00 a| QA76.575 b| .M852 1996
082 00 a| 006.6 2| 20
245 00 a| Multimedia systems and techniques / c| edited by Borko Furht.
260 a| Boston : b| Kluwer Academic Publishers, c| 1996.
263 a| 9601
300 a| xii, 325 p. : b| ill. ; c| 24 cm.
490 1 a| Kluwer international series in engineering and computer science ; SEC 350. Multimedia systems and applications
504 a| Includes bibliographical references and index.
591 a| BB: M222
650 0 a| Multimedia systems. =| ^A1159028
700 1 a| Furht, Borivoje. =| ^A394380
830 0 a| Kluwer international series in engineering and computer science v| SEC 350. =| ^A367247
830 0 a| Kluwer international series in engineering and computer science. p| Multimedia systems and applications. =| ^A1308987
998 a| 12/14/1995 b| 3/11/1996 c| 3/11/1996
596 a| 5
999 a| QA76.575 .M852 1996 i| 30000153503630 j| QA 000076.575 .M852 1996 l| _ALF m| B-ALF n| _ALF w| LC

ATTACHMENT 1B

Bibliographic Record - OCLC Number: 33665840

LDR	Record Status	'c' - Corrected or revised
	Type of Record	'a' - Language material
	Bibliographic Level	'm' - Monograph/Item
	Type of Control	' ' - No specified type of control
	Encoding Level	' ' - Full level
	Descriptive Cataloging Form	'a' - AACR2
001	33665840	
005	20240726010515.5	
008	Date Entered on File	'951031'
	Type of Date/Publication Status	's' - Single date
	Date1/Beginning Date of Publication	'1996'
	Date2/Ending Date of Publication	' '
	Place of Publication, Production, or Execution Code	'mau' - Massachusetts
	Illustrations	'a '
	Target Audience	' ' - Unknown or unspecified
	Form of Item	' ' - None of the following
	Nature of Contents Code	'b '
	Government Publication	' ' - Not a government publication
	Conference Publication	'0' - Not a conference publication
	Festschrift	'0' - Not a festschrift
	Index	'1' - Index present
	Literary Form	'0' - Not fiction
	Biography	' ' - No biographical material
	Language Code	'eng' - English
	Modified Record	' ' - Record is not modified
	Cataloging Source Code	' ' - National bibliographic agency

010 95047658

040 DLC **$b** eng **$c** DLC **$d** UKM **$d** BAKER **$d** NLGGC **$d** YDXCP **$d** BTCTA **$d** DEBBG **$d** OCLCQ **$d** ILU **$d** OCLCF **$d** OCLCO **$d** OCLCQ **$d** DEBSZ **$d** I8M **$d** OCLCO **$d** OCLCQ **$d** UKMGB **$d** OCLCO **$d** OCLCL **$d** OCLCQ

015 GB9639483 **$2** bnb

016 7 B9602532 **$2** bccb

016 7 006335065 **$2** Uk

019 34886256

020 0792396839 **$q** (alk. paper)

020 9780792396833 **$q** (alk. paper)

050 0 0 QA76.575 **$b** .M852 1996

082 0 0 006.6 **$2** 20

084 05.39 **$2** bcl

084 DAT 670f **$2** stub

084 ST 325 **$2** rvk

245 0 0 Multimedia systems and techniques / **$c** edited by Borko Furht.

260 Boston : **$b** Kluwer Academic Publishers, **$c** ©1996.

300 xii, 325 pages : **$b** illustrations ; **$c** 24 cm.
336 text **$b** txt **$2** rdacontent
337 unmediated **$b** n **$2** rdamedia
338 volume **$b** nc **$2** rdacarrier
490 1 The Kluwer international series in engineering and computer science. Multimedia systems and applica tions
504 Includes bibliographical references and index.
505 0 0 **$g** 1. **$t** Multimedia objects -- **$g** 2. **$t** Compression techniques and standards -- **$g** 3. **$t** Multimed ia interfaces: designing for diversity -- **$g** 4. **$t** Multimedia storage systems -- **$g** 5. **$t** Multimedia n etworks -- **$g** 6. **$t** Multimedia synchronization -- **$g** 7. **$t** Infoscopes: multimedia information syste ms -- **$g** 8. **$t** Scheduling in multimedia systems -- **$g** 9. **$t** Video indexing and retrieval.
650 0 Multimedia systems.
650 6 Multimédia.
650 7 Multimedia systems. **$2** fast **$0** (OCoLC)fst01028920
650 7 Multimedia **$2** gnd
650 1 7 Multimedia. **$2** gtt
653 0 Multi-media
700 1 Furht, Borivoje.
776 0 8 **$i** Online version: **$t** Multimedia systems and techniques. **$d** Boston : Kluwer Academic Publishers, ©1996 **$w** (OCoLC)603653720
776 0 8 **$i** Online version: **$t** Multimedia systems and techniques. **$d** Boston : Kluwer Academic Publishers, ©1996 **$w** (OCoLC)607695748
830 0 Kluwer international series in engineering and computer science. **$p** Multimedia systems and applicat ions.
856 4 1 **$3** Table of contents **$u** http://www.gbv.de/dms/goettingen/190769777.pdf **$z** Kostenfrei
856 4 **$3** Cover **$u** http://swbplus.bsz-bw.de/bsz053545370cov.htm **$v** 20151204153444
856 **$3** 1850-9999 **$u** http://www.springer.com/gb/ **$x** BLDSS
938 Baker & Taylor **$b** BKTY **$c** 199.00 **$d** 199.00 **$i** 0792396839 **$n** 0002788639 **$s** active
938 Baker and Taylor **$b** BTCP **$n** 95047658 //r96
938 YBP Library Services **$b** YANK **$n** 631891
029 1 AU@ **$b** 000012050070
029 1 DEBBG **$b** BV010869177
029 1 DEBBG **$b** BV021936453
029 1 DEBSZ **$b** 053545370
029 1 NZ1 **$b** 4664913
029 1 YDXCP **$b** 631891
029 1 UKMGB **$b** 006335065

ATTACHMENT 1C

LC control no.: sh 92002381

LCCN Permalink: https://lccn.loc.gov/sh92002381

HEADING: Multimedia systems

000 02042cz a2200373n 450

001 4843481

005 20120330075100.0

008 920429i| anannbabn |a ana

010 __ |**a** sh 92002381

035 __ |**a** (DLC)sh 92002381

035 __ |**a** (DLC)190166

040 __ |**a** DLC |**c** DLC |**d** DLC

053 _0 |**a** QA76.575

150 __ |**a** Multimedia systems

450 __ |**a** Computer-based multimedia information systems

450 __ |**a** Multimedia computing

450 __ |**a** Multimedia information systems

450 __ |**a** Multimedia knowledge systems

550 __ |**w** g |**a** Information storage and retrieval systems

670 __ |**a** Work cat.: Multimedia review, c1990.

670 __ |**a** ASTI: |**b** p. 1391 (Multimedia information systems)

670 __ |**a** Business period. index, 1990-91: |**b** p. 1134 (Multimedia computers, multimedia software)

670 __ |**a** BYTE, Feb. 1990: |**b** p. 203 ("Multimedia uses the computer to integrate and control diverse electronic media such as computer screens, videodisk players, CD-ROM disks, and speech and audio synthesizers")

670 __ |**a** Computer, Oct. 1985: |**b** p. 92 (Computer-based multimedia information system)

670 __ |**a** Computer data base thes. |**b** (Multimedia technology, multimedia software, multimedia terminals)

670 __ |**a** Computer lib. period., Sept. 1990 |**b** (Multimedia technology)

670 __ |**a** L.C. Nat. Demo. Lab. Info bull. Feb. 24, 1992: |**b** pp. 73-76.

670 __ |**a** LC data base, 4/10/92.

670 __ |**a** Lib. lit., Feb. 1992 |**b** (Multimedia systems)

675 __ |**a** Computer dict.; |**a** IAC; |**a** Legislative index, 1991; |**a** McGraw-Hill dict. sci. tech.; |**a** Stnd. gloss. of comp. terminology

680 __ |**i** Here are entered works on computer systems that integrate and present diverse media, such as text, graphics, still and moving images, and audio. Works on media containing information that may be interactively manipulated by individual users through the use of software or microprocessing capabilities are entered under |**a** Interactive multimedia.

681 __ |**i** Note under |**a** Interactive multimedia

906 __ |**t** 9412 |**u** te05 |**v** 0

953 __ |**a** yn07 |**b** ta25

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Search Request: Left Anchored Title = multimedia systems and techniques
Search Results: Displaying 1 of 1 entries

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Labeled View

Multimedia systems and techniques / edited by Borko Furht.

Type of Work: Text
Registration Number / Date: TX0004254747 / 1996-04-05
Title: Multimedia systems and techniques / edited by Borko Furht.
Imprint: Boston : Kluwer Academic Publishers, c1996.
Description: 325 p.
Copyright Claimant: Kluwer Academic Publishers
Date of Creation: 1995
Date of Publication: 1996-01-23
Names: Furht, Borko
Kluwer Academic Publishers

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ATTACHMENT 2A

leader 01470nam a2200337Ia 4500
001 993838333405961
005 20040420074400.0
008 040420s2004 caua b 101 0 eng d
010 ##$a 2004101915
020 ##$a9780769521084
020 ##$a0769521088
035 ##$a(OCoLC)54981135
035 ##$9531392
035 ##$a(MoKL)383833-lhalldb
035 ##$a(lhalldb)383833-lhalldb
040 ##$aLHL $cLHL
049 ##$aLHLA
090 ##$aQA76.575 $b.I615 2004
111 2#$aInternational Conference on Information Technology: Coding and Computing $n(5th : $d2004 : $cLas Vegas, Nev.)
245 10$aITCC 2004 : International Conference on Information Technology: Coding and Computing : $bproceedings : April 5-7, 2004, Las Vegas, Nevada / $cedited by Pradip K. Srimani (program chair) ... [et al.] ; sponsored by the IEEE Computer Society Task Force on Information Technology for Business Applications.
246 30$aInformation technology: coding and computing
260 ##$aLos Alamitos, California : $bIEEE Computer Society, $cc2004.
300 ##$a2 v. : $bill. ; $c28 cm.
500 ##$a"... 5th year ..."--P. xvii.
504 ##$aIncludes bibliographic references and author index.
530 ##$aAlso available via the World Wide Web.
650 #0$aMultimedia systems $vCongresses
650 #0$aInformation technology $vCongresses
650 #0$aComputer networks $vCongresses
650 #0$aCoding theory $vCongresses
700 1#$aSrimani, Pradip K.
710 2#$aIEEE Computer Society. $bTask Force on IT for Business Applications
948 ##$aLTI 09/01/2008

ATTACHMENT 2B

Bibliographic Record - OCLC Number: 54981135

LDR	Record Status	'c' - Corrected or revised
	Type of Record	'a' - Language material
	Bibliographic Level	'm' - Monograph/Item
	Type of Control	' ' - No specified type of control
	Encoding Level	' ' - Full level
	Descriptive Cataloging Form	'a' - AACR2
001	54981135	
005	20241106212702.5	
008	Date Entered on File	'040210'
	Type of Date/Publication Status	's' - Single date
	Date1/Beginning Date of Publication	'2004'
	Date2/Ending Date of Publication	' '
	Place of Publication, Production, or Execution Code	'cau' - California
	Illustrations	'a '
	Target Audience	' ' - Unknown or unspecified
	Form of Item	' ' - None of the following
	Nature of Contents Code	'b '
	Government Publication	' ' - Not a government publication
	Conference Publication	'1' - Conference publication
	Festschrift	'0' - Not a festschrift
	Index	'1' - Index present
	Literary Form	'0' - Not fiction
	Biography	' ' - No biographical material
	Language Code	'eng' - English
	Modified Record	' ' - Record is not modified
	Cataloging Source Code	'd' - Other

010 2004101915

040 MoKL **$b** eng **$c** DLC **$d** LHL **$d** E9X **$d** BTCTA **$d** YDXCP **$d** CLU **$d** OCLCQ **$d** OCLCF **$d** OCLCQ **$d** OCLCO **$d** OCL **$d** OCLCO **$d** OCLCQ **$d** OCLCO **$d** OCLCQ **$d** IG#

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020 9780769521084 **$q** (paperback)

042 lccopycat

050 0 0 QA76.575 **$b** .I27 2004

050 1 4 T58.5 **$b** .I5663 2004

082 0 0 006.7 **$2** 22

111 2 International Conference on Information Technology: Coding and Computing **$n** (5th : **$d** 2004 : **$c** Las Vegas, Nev.)

245 1 0 ITCC 2004 : International Conference on Information Technology: Coding and Computing : **$b** April 5-7, 2004, Las Vegas, Nevada : proceedings / **$c** edited by Pradip K. Srimani (program chair) [and oth ers] ; sponsored by the IEEE Computer Society Task Force on Information Technology for Business A pplications.

246 3 0 Information technology: coding and computing

260 Los Alamitos, Calif. : **$b** IEEE Computer Society, **$c** ©2004.

300 2 volumes : **$b** illustrations ; **$c** 28 cm
336 text **$b** txt **$2** rdacontent
337 unmediated **$b** n **$2** rdamedia
338 volume **$b** nc **$2** rdacarrier
500 "IEEE Computer Society Order Number P2108"--Title page verso.
504 Includes bibliographical references and author index.
530 Also available via the World Wide Web.
650 0 Multimedia systems **$v** Congresses.
650 0 Information technology **$v** Congresses.
650 0 Computer networks **$v** Congresses.
650 0 Coding theory **$v** Congresses.
650 6 Multimédia **$v** Congrès.
650 6 Technologie de l'information **$v** Congrès.
650 6 Réseaux d'ordinateurs **$v** Congrès.
650 7 Coding theory. **$2** fast **$0** (OCoLC)fst00866237
650 7 Computer networks. **$2** fast **$0** (OCoLC)fst00872297
650 7 Information technology. **$2** fast **$0** (OCoLC)fst00973089
650 7 Multimedia systems. **$2** fast **$0** (OCoLC)fst01028920
655 7 Conference papers and proceedings. **$2** fast **$0** (OCoLC)fst01423772
700 1 Srimani, Pradip K.
710 2 IEEE Computer Society. **$b** Task Force on IT for Business Applications.
856 4 1 **$3** IEEE Xplore **$u** http://ieeexplore.ieee.org/servlet/opac?punumber=9035
938 Ingram Library Services **$b** INGR **$n** in012081584
938 Baker and Taylor **$b** BTCP **$n** 2004101915
938 YBP Library Services **$b** YANK **$n** 2101826
029 1 AU@ **$b** 000026234520
029 1 NZ1 **$b** 8840662

ATTACHMENT 2C

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LC control no.: sh2008107510
LCCN Permalink: https://lccn.loc.gov/sh2008107510
HEADING: Multimedia systems Congresses

000 00482cz a2200169n 450
001 7458157
005 20110729160517.0
008 080304|| anannbabn |n ana
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035 __ |**a** (DLC)383685
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040 __ |**a** DLC |**b** eng |**c** DLC
150 __ |**a** Multimedia systems |**v** Congresses
667 __ |**a** Record generated for validation purposes.
670 __ |**a** Work cat.: Verändern neue Medien die Wirklichkeit?, [1999]
906 __ |**t** 8888 |**u** te00 |**v** 0
953 __ |**a** te00

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LCCN Permalink: https://lccn.loc.gov/sh2008104441

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000 00495cz a2200169n 450
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150 __ |**a** Information technology |**v** Congresses
667 __ |**a** Record generated for validation purposes.
670 __ |**a** Work cat.: Informat͡siĭno-keruiu͡chi systemy i kompleksy,
906 __ |**t** 8888 |**u** te00 |**v** 0
953 __ |**a** te00

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000 00490cz a2200169n 450
001 7437752
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008 080206|| anannbabn |n ana
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035 __ |**a** (DLC)376758
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040 __ |**a** DLC |**b** eng |**c** DLC
150 __ |**a** Computer networks |**v** Congresses
667 __ |**a** Record generated for validation purposes.
670 __ |**a** Work cat.: Combinatorial and algorithmic aspects of networking, c2005
906 __ |**t** 8888 |**u** te00 |**v** 0
953 __ |**a** te00

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LC control no.: sh2008101156
LCCN Permalink: https://lccn.loc.gov/sh2008101156
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000 00485cz a2200169n 450
001 7437686
005 20110729160102.0
008 080206|| anannbabn |n ana
010 __ |**a** sh2008101156
035 __ |**a** (DLC)376692
035 __ |**a** (DLC)sh2008101156
040 __ |**a** DLC |**b** eng |**c** DLC
150 __ |**a** Coding theory |**v** Congresses
667 __ |**a** Record generated for validation purposes.
670 __ |**a** Work cat.: Proceedings, 2001 IEEE Information Theory Workshop, c2001
906 __ |**t** 8888 |**u** te00 |**v** 0
953 __ |**a** te00

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Type of Work: Text
Registration Number / Date: TX0006109714 / 2005-02-07
Title: International conference on information technology : coding and computing : vol. 1[-2] : 5-7 April 2004, Las Vegas, Nevada / edited by Pradip K. Srimani, A. Abraham, M. Cannataro ... [et al.]
Imprint: Los Alamitos, CA : IEEE Computer Society, c2004.
Copyright Claimant: IEEE (employer for hire)
Date of Creation: 2004
Date of Publication: 2004-04-05
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Names: Srimani, Pradip K.
Abraham, A.
Cannataro, M.
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« 2002

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MARCH 19, 2002

National Standard Developed for the Digital Talking Book

Press Contact: Audrey Fischer (202) 707-0022
Public Contact: Robert Fistick (202) 707-9279

A national standard for the Digital Talking Book (DTB) has recently been adopted by the National Information Standards Organization (NISO).

The five-year effort to develop the NISO DTB standard (ANSI/NISO Z39.86-2002) was coordinated by the National Library Service for the Blind and Physically Handicapped (NLS) in the Library of Congress in partnership with an international committee. The NISO DTB standard will make electronic resources presented in DTB format more accessible to print-disabled readers worldwide.

"This single standard addresses the requirements of a range of agencies serving users with a wide variety of reading needs, said NLS Director Frank Kurt Cylke. "It is truly a universal standard that will benefit the blind community for generations to come."

A Digital Talking Book is a collection of electronic files arranged to present information to the blind and physically handicapped reader through alternative media. The most common medium will be human speech. However, a DTB produced in accordance with the new standard can include a file containing the contents of the document in text form, thereby permitting output through synthetic speech, refreshable braille display devices, or visual display in large print.

The NISO DTB standard was built on existing standards and specifications to make use of programming skills and software tools that were originally developed for other purposes. The standard was also based on specifications formulated by blind and visually impaired users who were included in the development effort. Partner agencies include the Association of Specialized and Cooperative Library Agencies (of the American Library Association); American Council of the Blind; American Foundation for the Blind; American Printing House for the Blind; Blinded Veterans Association; Canadian National Institute for the Blind; the DAISY Consortium; Hadley School for the Blind; Assistive Devices Industry Office-Industry Canada; IsSound Corporation; National Federation of the Blind; Recording for the Blind and Dyslexic; Talking Book Publishers, Inc.; Telex Communications, Inc.; VisuAide, Inc.; and the World Blind Union.

NISO is the only U.S. group accredited by the American National Standards Institute (ANSI) to develop and

promote voluntary technical standards for use in information delivery services for libraries, publishers, and related information technology organizations. NISO standards are developed by consensus under the guidance of experts and practitioners in the field to meet the needs of both the information user and the producer. For its work on the DTB standard, NISO was one of the recipients of the 2001 Collaboration and Coordination Award presented by the International Coalition of Access Engineers and Specialists. For information about NISO's current activities or to download NISO standards, including the NISO DTB standard, visit the NISO Web site at www.niso.org.

For more than 70 years, NLS has been a leader in providing library services to blind and physically handicapped individuals. Each year it distributes 23 million books and magazines to a readership of more than 759,000 individuals through a network of 141 regional and subregional libraries. For more information about NLS, visit its Web site at www.loc.gov/nls.

###

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ISSN 0731-3527

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National Information Standards Organization

Standards: Putting Innovation to Work

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Become a Member
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International

What's a Standard?
A NISO standard developed through consensus, identifies model methods, materials, or practices for libraries, bibliographic and information services, and publishers.

Keeping up with NISO | NISO Calendar

- Digital Talking Book Standard Now Available
  The national standard for the Digital Talking Book (ANSI/NISO Z39.86-2002) is approved and published. It's available for free download in PDF and HTML.
- E-metrics on NISO Fast Track
  NISO Statistics standards committee chaired by Denise Davis will release an e-metrics data dictionary in a web-accessible database in May.
- Linking News
  A recent NISO/NFAIS Workshop "Your Content and Mine" provided a wealth of practical information on integrating content from multiple providers. The workshop revealed good news: research shows that the average linking scenario saves the user 42 separate steps, saving time and money.
- Ongoing NISO Initiatives
  Workshops, programs, other activities.

NISO Standards | NISO Press

NISO is the only standards organization that makes its standards available freely on the web. Link here to NISO's top sellers.

ANSI/NISO Z39.50 - 1995
Information Retrieval : Application Service Definition & Protocol Specification

ANSI/NISO Z39.84 - 2000
Syntax for the Digital Object Identifier

ANSI/NISO Z39.79 - 2001
Environmental Conditions for Exhibiting Library and Archival Materials

ANSI/NISO Z39.86 - 2002
Specifications for the Digital Talking Book

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ATTACHMENT 3C

DTB (Digital Talking Book), 2002

>> Back

Table of Contents

- Identification and description
- Local use
- Sustainability factors
- Quality and functionality factors
- File type signifiers
- Notes
- Format specifications
- Useful references

Format Description Properties

- ID: fdd000053
- Short name: DTB_2002
- Content categories: text, sound
- Format Category: encoding, file-format
- Other facets: container-bundle, text, structured, symbolic
- Last significant FDD update: 2022-04-13
- Draft status: Full

Identification and description

Full name	Digital Talking Book. ANSI/NISO Z39.86-2002
Description	The NISO Digital Talking Book Standard, ANSI/NISO Z39.86-2002, defines the format and content of the electronic file set that comprises a digital talking book (DTB) and establishes a limited set of requirements for DTB playback devices. It uses established and new specifications to delineate the structure of DTBs whose content can range from XML text only, to text with corresponding spoken audio, to audio with little or no text. DTBs are designed to make print material accessible and navigable for

	blind or otherwise print-disabled persons. The standard comprises a set of files, including a mandatory package file, which incorporates a *manifest* listing all the other component files and a *spine*, which indicates logical reading order. Component files can be of several types, including: textual content (in XML); audio files; image files; synchronization files (in SMIL); navigation control files (in XML); bookmark/highlight files (in XML).
Production phase	This bundle of files is likely to be used primarily as a middle-state format, with dissemination to end-users managed through publishers or aggregators who provide in a form appropriate for viewers/players that enforce limitations on access and use consistent with terms imposed by copyright holders.
Relationship to other formats	
Contains	OEBPS_1_0, OEBPS, Open Ebook Forum Publication Structure 1.0.1
Defined via	XML_DTD, XML Document Type Definition (DTD)
May contain	WAVE_LPCM, WAVE Audio File with LPCM Audio
May contain	MP3_ENC, MP3 Audio Encoding
May contain	AAC_MP4, Advanced Audio Coding (MPEG-4)
Has modified version	DTB_2002_NLS, Digital Talking Book, NLS extension for AMR-WB+ Speech Codec. NLS is the National Library Service for the Blind and Print Disabled (NLS), a part of the Library of Congress. The NLS variant of DTB_2002 permits a restricted set of features and uses an audio codec that is not allowed for in the base standard.
Has later version	DTB_2005, DTB (Digital Talking Book), 2005

Local use

LC experience or existing holdings	The National Library Service for the Blind and Print Disabled (NLS), which is part of LC, has been actively involved in the development of this standard. The unit employs an extended version, DTB_2002_NLS.
LC preference	Suggested format for digital talking books. A DTB_2002 or DTB_2002_NLS incorporating the full text of a work is among the useful XML-based formats for textual works, assuming no encryption or DRM is applied.

Sustainability factors

Disclosure	Open standard
Documentation	ANSI/NISO Z39.86-2002. Specifications for the Digital Talking Book. ISSN: 1041-5653

Adoption	The National Library Service for the Blind and Physically Handicapped (NLS) is using DTB_2002_NLS, the extended version of the standard for the production of NLS talking books. As of April 2009, none of the NLS talking books include full text and there are no plans to produce books with full text. Bookshare.Org, which provides full-text books to print-handicapped users, makes the full text (without audio) of books available in several formats, including the NISO DTB standard (aka DAISY 3). A forty-member panel representing educators, publishers, technology specialists, and advocacy groups, sponsored by Office of Special Education Programs at the U. S. Department of Education recommended, in a report released in July 2004, that a specific application (or profile) of the NISO DTB standard be adopted as version 1 of the National Instructional Materials Accessibility Standard (NIMAS). The National Center on Accessible Instructional Materials provides a list of hardware and software supporting DTB and DAISY specifications.
Licensing and patents	None
Transparency	See information on the encoding formats employed for the files that comprise a DTB file set: XML, LPCM, MP3, AAC_MP4. XML and LPCM both rate highly for transparency.
Self-documentation	The Package file can include Dublin Core metadata and an extended set of elements intended to record information about rights and the provenance and generation of the talking book from a source text.
External dependencies	None. The format is designed to support effective use of special hardware and software players for the visually impaired, but does not require them.
Technical protection considerations	None in relation to the sets of files that comply with the ANSI/ NISO Z39.86-2002 specification. Digital Talking Books are likely to be distributed to end users via mechanisms that do impose technical protections. Hence it is probable that LC will need to receive such files direct from publisher or aggregator by a special transmittal process rather than by harvesting as if an end user.

Quality and functionality factors

Sound	
Normal rendering	Good support.
Fidelity (high audio resolution)	Not intended for audio quality beyond CD quality. DTB players must support sample rates of 44.1, 22.05, and 11.025 kHz at a depth of 16 bits per sample. Compressed audio must be encoded such that the output sampling rate is restricted to one of the above three rates and uses a constant bit rate.

Multiple channels	DTB Players are not required to support multiple channels, but must recognize stereo and render at least as monaural.
Support for user-defined sounds, samples, and patches	Not investigated at this time.
Functionality beyond normal rendering	Synchronization with text transcription.
Text	
Normal rendering	Good support.
Integrity of document structure	The logical structure of a document is an important part of a DTB with textual content. See DAISY Structure Guidelines.
Integrity of layout and display	This standard focuses on the textual content, the logical structure, and the synchronization of text with audio of the text being read. Layout is not of primary significance in rendering for the visually impaired.
Support for mathematics, formulae, etc.	Not supported
Functionality beyond normal rendering	Supports embedding of audio, images, and synchronization of text with audio of the text being read.

File type signifiers and format identifiers

Tag	Value	Note
Filename extension	opf	For the required Package file. Documented in NISO standard.
Filename extension	xml	For textual content files. Documented in NISO standard.
Filename extension	ncx	For navigation control files. Documented in NISO standard.
Filename extension	aac	For AAC_MP4 audio files. Documented in NISO standard.
Filename extension	mp3	For MP3 audio files. Documented in NISO standard.
Filename extension	wav	For WAVE_LPCM audio files. Documented in NISO standard.
Pronom PUID	See note.	PRONOM has no corresponding entry as of April 2022.
Wikidata Title ID	Q1151676	See https://www.wikidata.org/wiki/Q1151676.

Notes

General	The standard supports any of the following classes of digital talking

	book: • Audio with Title element only: DTB without structure. This is the simplest class of DTB and is used for books where structure will not be applied. The XML textual content file may not be present, or if it is, contains only the title of the book, and other required notation. The book must be read linearly. Direct access to points within the DTB is not possible. • Audio with NCX only (Navigation Control): DTB with structure. The XML textual content file, if present, contains only the structure of the book and may contain links to features such as narrated footnotes, etc. This is the most common form of DTB and is ideal for stand-alone players. • Audio with NCX and partial text: DTB with structure and some additional text. The XML textual content file contains only the structure of the book and the text of components where keyword searching and direct access to the text would be beneficial, e.g., index, glossary, etc. • Audio and full text: DTB with structure and complete text and audio. This form of a DTB is the most complex but provides the greatest level of access. The XML textual content file contains the structure and the full text of the book. The audio and the text are synchronized. • Full text and some audio: DTB with structure, complete text and limited audio. The XML textual content file contains the structure and the text of the book. The audio files contain recordings of parts of the text. This type of DTB could be used for a dictionary where only pronunciations were provided in audio form. • Text and no audio: E-text with structure. The XML textual content file contains the structure and text of the book. There are no audio files.
History	This format is also known as DAISY 3, being the third in a sequence of talking book formats. From the point of view of long-term sustainability, the earlier DAISY formats are less likely to be appropriate for LC collections. The previous version was Daisy 2.02, which was based on XHTML rather than XML. Link available via Internet Archive.

Format specifications

- ANSI/NISO Z39.86-2002. Specifications for the Digital Talking Book (https://web.archive.org/web/20110805190514/http://www.niso.org/workrooms/daisy/Z39-86-2002.html). From NISO as HTML. Available via Internet Archive capture from August 5, 2011.
- Specifications for the Digital Talking Book (ANSI/NISO Z39.86-2002), Use and Maintenance (https://web.archive.org/web/20070726014154///www.loc.gov/nls/niso/dtd.htm). Versions of the specifications presented by the National Library Service for the Blind and Physically Handicapped (NLS). Available

via Internet Archive capture from July 26, 2007.
- Digital Talking Book Expanded Document Type Definition Documentation for Version V1.1.0 (https://web.archive.org/web/20080327052703/https://www.loc.gov/nls/z3986/v100/dtbook110doc.htm). HTML version of DTD for textual component of DTB. Available via Internet Archive.
- ANSI/NISO Z39.86 - 2002 Specifications for the Digital Talking Book. ISBN: 1-880124-54-8

Useful references

URLs

- Daisy Consortium, maintenance agency for NISO Z39.86 (https://daisy.org/activities/standards/daisy/).
- Working Papers on the Digital Talking Book Standard from the National Information Standards Organization (NISO) (https://web.archive.org/web/20070630053202///www.loc.gov/nls/z3986/). Available via Internet Archive capture from June 30, 2007.
- Supporting Documentation for ANSI/NISO Z39.86, Specifications for the Digital Talking Book (https://web.archive.org/web/20051128065641///www.loc.gov/nls/z3986/). A previous version of the above web page, from before the standard's approval by NISO. Includes a link to "Advisory Committee Activities." Available via Internet Archive capture from November 28, 2005.
- Theory Behind the DTBook DTD (https://daisy.org/info-help/document-archive/archived-publications/theory-behind-the-dtbook-dtd/).
- DAISY Structure Guidelines (https://web.archive.org/web/20130220060453/http://www.daisy.org/structure-guidelines). Available via Internet Archive capture from February 20, 2013.
- National Instructional Materials Accessibility Standard Report -- Version 1. (https://web.archive.org/web/20210122123954/https://aem.cast.org/about/publications/2004/ncac-nimas-report-national-file-format.html). 2004. Available via Internet Archive.
- Technologies for AIM (Accessible Instructional Materials) and NIMAS (National Instructional Materials Accessibility Standard) (https://aem.cast.org/nimas-nimac/nimas-nimac).
- Wikidata entry for Q1151676 (https://www.wikidata.org/wiki/Q1151676). Information in Wikidata about DAISY Digital Talking Book. Wikidata Title ID: Q1151676.

Last Updated: 09/01/2023

Digital Preservation Home | Digital Formats Home

ATTACHMENT 3D

Bibliographic Record - OCLC Number: 50902883

LDR	Record Status	'c' - Corrected or revised
	Type of Record	'a' - Language material
	Bibliographic Level	'm' - Monograph/Item
	Type of Control	' ' - No specified type of control
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005	20241210044822.4	
008	Date Entered on File	'021030'
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	Date2/Ending Date of Publication	' '
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	Illustrations	' '
	Target Audience	' ' - Unknown or unspecified
	Form of Item	' ' - None of the following
	Nature of Contents Code	'b '
	Government Publication	' ' - Not a government publication
	Conference Publication	'0' - Not a conference publication
	Festschrift	'0' - Not a festschrift
	Index	'0' - No index
	Literary Form	'0' - Not fiction
	Biography	' ' - No biographical material
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040 CPV **$b** eng **$c** CPV **$d** YDXCP **$d** OCLCQ **$d** OCLCO **$d** CNUTO **$d** OCLCF **$d** OCLCO **$d** OCLCQ **$d** OCLCL **$d** OCLCO **$d** OCLCL **$d** OCLCO

020 1880124548

020 9781880124543

050 4 Z5347 **$b** .N38 2002

082 0 4 070.5/73 **$q** OCoLC **$2** 22/eng/20230216

110 2 National Information Standards Organization (U.S.) **$1** https://id.oclc.org/worldcat/entity/E39QQPVp7K3wqBRjCQXdtk4hTR

245 1 0 Specifications for the digital talking book : **$b** an American national standard / **$c** developed by the National Information Standards Organization.

260 Bethesda, Md. : **$b** NISO Press, **$c** ©2002.

300 xii, 124 pages ; **$c** 28 cm

336 text **$b** txt **$2** rdacontent

337 unmediated **$b** n **$2** rdamedia

338 volume **$b** nc **$2** rdacarrier

490 1 National information standards series, **$x** 1041-5653

500 "ANSI/NISO Z39.86-2002."

500 "Approved March 6, 2002 by the American National Standards Institute."

504 Includes bibliographical references.

520 3 This standard defines the format and content of the electronic file set that comprises a digital talking b ook (DTB) and establishes a limited set of requirements for DTB playback devices. It uses established and new specifications to deliniate the structure of DTBs whose content can range from XML text onl y, to text with corresponding spoken audio, to audio with little or no text. DTBs are designed to make print material accessible and navigable for blind or otherwise print disabled persons.

650 0 Talking books **$x** Standards.

650 0 Sound **$x** Recording and reproducing **$x** Digital techniques **$x** Standards.

650 6 Livres audio pour personnes ayant une déficience visuelle **$x** Normes.

650 6 Son **$x** Enregistrement et reproduction **$x** Techniques numériques **$x** Normes.

650 7 Sound **$x** Recording and reproducing **$x** Digital techniques **$x** Standards **$2** fast

710 2 American National Standards Institute. **$1** https://id.oclc.org/worldcat/entity/E39QH7Jmqt47xhFPY MKrtCpX9t

776 0 8 **$i** Online version: **$a** National Information Standards Organization (U.S.). **$t** Specifications for the d igital talking book. **$d** Bethesda, Md. : NISO Press, ©2002 **$w** (OCoLC)605466677

776 0 8 **$i** Online version: **$a** National Information Standards Organization (U.S.). **$t** Specifications for the d igital talking book. **$d** Bethesda, Md. : NISO Press, ©2002 **$w** (OCoLC)606282751

830 0 National information standards series. **$x** 1041-5653

938 YBP Library Services **$b** YANK **$n** 1870345

029 1 YDXCP **$b** 1870345

ATTACHMENT 3E

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035 __ |**a** (DLC)7752166

035 __ |**a** (DLC)sp 85132098

035 __ |**a** (DLC)414101

040 __ |**a** DLC |**c** DLC |**d** DLC

053 _0 |**a** Z5347

150 __ |**a** Talking books

550 __ |**w** g |**a** Audiobooks

550 __ |**w** g |**a** Blind |**x** Books and reading

680 __ |**i** Here are entered works on spoken texts recorded specifically for use by the blind or people with visual disabilities.

906 __ |**t** 0905 |**u** tc09 |**v** 0

910 __ |**a** Record saved by td14 on 12/01/2015 at 16:19:16

953 __ |**a** xx00 |**b** td14

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ATTACHMENT 3F

LIBRARY OF CONGRESS AUTHORITIES

LC control no.: sh 85127314

LCCN Permalink: https://lccn.loc.gov/sh85127314

HEADING: Standards

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035 __ |**a** (DLC)sh 85127314

035 __ |**a** (DLC)122890

040 __ |**a** DLC |**c** DLC |**d** DLC

150 __ |**a** Standards

260 __ |**i** subdivision |**a** Standards |**i** under topical headings for descriptions of the example or model set up and established by authority as the measure of quantity, quality, value, extent, weight, etc., to be followed, e.g. |**a** Automobiles--Standards; Corn--Standards

906 __ |**t** 8738 |**u** fk07 |**v** 0

953 __ |**a** xx00 |**b** fj25

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ATTACHMENT 3G

LIBRARY OF CONGRESS AUTHORITIES

LC control no.: sh 98007202

LCCN Permalink: https://lccn.loc.gov/sh98007202

HEADING: Sound Recording and reproducing Digital techniques Standards

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008 981104i| anannbabn |n ana
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906 __ |**t** 9845 |**u** te04 |**v** 0
952 __ |**a** Prompted by AuSU
953 __ |**a** te04

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ATTACHMENT 4A

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100 1  $aSeuss, $cDr.
245 14 $aThe cat in the hat / $cby Dr. Seuss.
260   $a[New York] : $bRandom House, $c1957.
300   $a61 p. : $bill. (some col.) ; $c24 cm.
520   $aTwo children sitting at home on a rainy day are visited by the Cat in the Hat who shows
      them some tricks and games.
650 1  $aCats $vFiction.
650 1  $aStories in rhyme.
650 1  $aNonsense verses.
655 7  $aReaders (Publications) $2lcgft
690   $aEarly books.
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019   $a470778 $a11482304 $a12407235 $a13444233 $a13697714 $a19683879 $a24533496 $a26277256
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898   $aqBooks
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Back to Title

Home | **Full Site** | **About**

English | **Español**

ATTACHMENT 4B

Bibliographic Record - OCLC Number: 304833

LDR	Record Status	'c' - Corrected or revised
	Type of Record	'a' - Language material
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	Government Publication	' ' - Not a government publication
	Conference Publication	'0' - Not a conference publication
	Festschrift	'0' - Not a festschrift
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010 57006466

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084 I712. 85 **$2** clc
100 1 Seuss, **$c** Dr., **$e** author, **$e** illustrator. **$1** https://id.oclc.org/worldcat/entity/E39PCjrjvfmppPJ3R98k6dKMHd
245 1 4 The cat in the hat / **$c** by Dr. Seuss.
250 [First edition].
264 1 [New York] : **$b** Random House, **$c** [1957]
264 4 **$c** ©1957
300 2 unnumbered pages, 61 pages : **$b** color illustrations ; **$c** 24 cm
336 text **$b** txt **$2** rdacontent
337 unmediated **$b** n **$2** rdamedia
338 volume **$b** nc **$2** rdacarrier
340 **$m** 8vo. **$2** rdabf
500 "For beginning readers"--Cover
500 "Educational edition published by Houghton Mifflin Company, Boston. Trade edition published simultaneously in New York by Random House, Inc. and in Toronto, Canada, by Random House of Canada, Limited"--Title page verso
520 Two children sitting at home on a rainy day are visited by the Cat in the Hat who shows them some tricks and games.
526 0 Accelerated Reader **$c** 2.0 **$d** 0.5.
600 0 0 Cat in the Hat **$c** (Fictitious character) **$v** Juvenile poetry.
650 0 Cats **$v** Juvenile poetry.
650 0 Siblings **$v** Juvenile poetry.
650 0 Play **$v** Juvenile poetry.
650 0 Indoor games **$v** Juvenile poetry.
650 0 Wit and humor, Juvenile.
650 0 Children's poetry.
650 0 Children's stories, American.
650 1 Fantasy.
650 1 Stories in rhyme.
650 6 Frères et sœurs **$v** Poésie pour la jeunesse.
650 6 Jeu **$v** Poésie pour la jeunesse.
650 6 Humour pour la jeunesse.
650 6 Poésie enfantine.
650 6 Histoires pour enfants américaines.
650 0 7 Fantasy. **$2** cct
650 0 7 Stories in rhyme. **$2** cct
650 0 7 Children's stories, American. **$2** cct
650 7 Children's poetry **$2** fast

600 0 7 Cat in the Hat **$c** (Fictitious character) **$2** fast
650 7 Siblings **$2** fast
650 7 Cats **$2** fast
650 7 Children's stories, American **$2** fast
650 7 Indoor games **$2** fast
650 7 Play **$2** fast
650 7 Wit and humor, Juvenile **$2** fast
650 7 Fantasy fiction. **$2** sears
650 7 Stories in rhyme. **$2** sears
650 7 Cats **$x** Fiction. **$2** sears
650 7 Fantastic fiction. **$2** sears
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650 8 Fantastic fiction. **$0** (MILREC)1126172
650 8 Stories in rhyme. **$0** (DLC)sh2005008473
653 Nonsense verse.
653 Readers, Supplementary.
655 0 Picture books for children.
655 1 Stories in rhyme.
655 7 readers. **$2** aat
655 7 picture books. **$2** aat
655 7 Readers (Publications) **$2** fast
655 7 Picture books **$2** fast
655 7 Humorous fiction **$2** fast
655 7 Stories in rhyme **$2** fast
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655 7 Poetry **$2** fast
655 7 Fantasy fiction. **$2** gsafd
655 7 Humorous fiction. **$2** lcgft
655 7 Stories in rhyme. **$2** lcgft
655 7 Readers (Publications) **$2** lcgft
655 7 Picture books. **$2** lcgft
655 7 Dust jackets (Bindings) **$y** 1957. **$2** rbbin
655 7 Fantasy literature **$y** 1957. **$2** rbgenr
655 7 Juvenile literature. **$2** rbgenr
655 7 Histoires rimées. **$2** rvmgf
655 7 Lectures et morceaux choisis. **$2** rvmgf
655 7 Livres d'images. **$2** rvmgf
710 2 Random House (Firm), **$e** publisher.
752 United States **$b** New York **$d** New York
776 0 8 **$i** Online version: **$a** Seuss, Dr. **$t** Cat in the hat. **$d** [New York] Random House [1957] **$w** (OCoLC)588876324
776 0 8 **$i** Online version: **$a** Seuss, Dr. **$t** Cat in the hat. **$d** [New York] Random House [1957] **$w** (OCoLC)608416770
856 4 2 **$3** Contributor biographical information **$u** http://catdir.loc.gov/catdir/enhancements/fy0709/2007271288-b.html

856 4 2 **$3** Publisher description **$u** http://catdir.loc.gov/catdir/enhancements/fy0709/2007271288-d.html
938 Ingram Library Services **$b** INGR **$n** in900439659
938 Brodart **$b** BROD **$n** 22284990 **$c** $8.99
938 Baker and Taylor **$b** BTCP **$n** 57006466
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029 1 AU@ **$b** 000022748109
029 1 NZ1 **$b** 3028886
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029 1 UKMGB **$b** 003344613

ATTACHMENT 4C

LIBRARY OF CONGRESS AUTHORITIES

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HEADING: Cats Juvenile poetry

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150 __ |**a** Cats |**v** Juvenile poetry
667 __ |**a** Record generated for validation purposes.
670 __ |**a** Work cat.: Raining cats and dogs, c1993
906 __ |**t** 8888 |**u** tc00 |**v** 0
953 __ |**a** tc00

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ATTACHMENT 4D

LC control no.: sh 85017225

LCCN Permalink: https://lccn.loc.gov/sh85017225

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035 __ |**a** (DLC)16594

040 __ |**a** DLC |**c** DLC |**d** DLC |**d** IEN

150 __ |**a** Siblings

450 __ |**w** nne |**a** Brothers and sisters

450 __ |**a** Sibling relations

450 __ |**a** Sisters and brothers

550 __ |**w** g |**a** Families

670 __ |**a** Work cat.: 2020047795: Dobrich, Johanna. Working with survivor siblings in psychoanalysis : ability and disability in clinical process, 2021.

670 __ |**a** 2010034828: Sibling development : implications for mental health practitioners, 2011.

670 __ |**a** 1091330743 : Deaver, Mason. I wish you all the best, 2019.

670 __ |**a** 84903121 : Flannery, Denis. On sibling love, queer attachment and American writing, 2007.

670 __ |**a** An Act to Amend Title 36, United States Code, to Revise the Congressional Charter of the Military Order of the Purple Heart of the United States of America, Incorporated, to Authorize Membership in the Corporation for the Spouse and Siblings of a Recipient of the Purple Heart Medal, 2008 (viewed online February 14, 2022) |**u** https://www.govinfo.gov/content/pkg/PLAW-110publ207/html/PLAW-110publ207.htm

670 __ |**a** Healthline website, February 3, 2022 (viewed online February 14, 2022): |**b** Understanding what it mean to be nonbinary (instead of sister and brother, use sibling) |**u** https://www.healthline.com/health/transgender/nonbinary#gender-neutral-language

670 __ |**a** Stonewall UK website, 10 ways to step up as an ally to non-binary people, July 14, 2021 (viewed online March 25, 2022): |**b** (Use words that define the relationship instead of the relationship and gender. For example, use ‘parents’, ‘partner’, ‘children’ or ‘siblings’) |**u** https://www.stonewall.org.uk/about-us/news/10-ways-step-ally-non-binary-people

670 __ |**a** Boston Children's Hospital, What it means to be non-binary: A guide for parents, December 4, 2019 (viewed online March 25, 2022): |**b** (start by using neutral language… 'sibling' instead of 'sister.') |**u** https://answers.childrenshospital.org/non-binary-guide/

688 __ |**a** Heading changed from Brothers and sisters to Siblings in June 2022.

906 __ |**t** 9228 |**u** fk05 |**v** 1

910 __ |**a** Proposal saved by js06 on 05/31/2022 at 10:52:01

952 __ |**a** Bib records to be changed: 7880

952 __ |**a** LC pattern: Parents

953 __ |**a** xx00 |**b** fh08

906 __ |**t** 2205 |**v** 0

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ATTACHMENT 4E

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LC control no.: sh 85071187

LCCN Permalink: https://lccn.loc.gov/sh85071187

HEADING: Juvenile poetry

000 00719cz a2200169n 450

001 4722080

005 20190825061439.0

008 860211n| cnannbbbn |n ann

010 __ |**a** sh 85071187

035 __ |**a** (DLC)sh 85071187

035 __ |**a** (DLC)68765

040 __ |**a** DLC |**c** DLC |**d** DLC

150 __ |**a** Juvenile poetry

260 __ |**i** subdivision |**a** Juvenile poetry |**i** under names of countries, cities, etc., names of individual persons and corporate bodies, and under classes of persons, ethnic groups, names of deities and mythological or legendary figures, individual and groups of fictitious and legendary characters, and topical headings

906 __ |**t** 9628 |**u** te03 |**v** 0

910 __ |**a** Record saved by td04 on 06/04/2018 at 14:12:18

953 __ |**a** xx00 |**b** ta27

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ATTACHMENT 4F

LIBRARY OF CONGRESS AUTHORITIES

LC control no.: sh 85103365
LCCN Permalink: https://lccn.loc.gov/sh85103365
HEADING: Play

000 00432cz a2200193n 450
001 4753079
005 20120327100616.0
008 860211i| anannbabn |b ana
010 __ |**a** sh 85103365
035 __ |**a** (DLC)sh 85103365
035 __ |**a** (DLC)99764
040 __ |**a** DLC |**c** DLC |**d** DLC
150 __ |**a** Play
450 __ |**a** Recreations
550 __ |**w** g |**a** Recreation
550 __ |**a** Amusements
550 __ |**a** Games
906 __ |**t** 9317 |**u** te05 |**v** 0
953 __ |**a** xx00 |**b** ta21

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ATTACHMENT 4G

LIBRARY OF CONGRESS AUTHORITIES

LC control no.: sh 85065782
LCCN Permalink: https://lccn.loc.gov/sh85065782
HEADING: Indoor games

000 00567cz a2200217n 450
001 4716867
005 20120326100326.0
008 860211i| anannbabn |a ana
010 __ |**a** sh 85065782
035 __ |**a** (DLC)sh 85065782
035 __ |**a** (DLC)63552
040 __ |**a** DLC |**c** DLC |**d** DLC
053 _0 |**a** GV1221 |**b** GV1229
150 __ |**a** Indoor games
450 __ |**a** Home games
450 __ |**a** Parlor games
450 __ |**a** Rainy day games
550 __ |**w** g |**a** Games
670 __ |**a** American Heritage dict. |**b** (Parlor game: A game that can be played indoors)
906 __ |**t** 9645 |**u** te05 |**v** 0
953 __ |**a** xx00 |**b** td14

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ATTACHMENT 4H

LC control no.: sh 85147133

LCCN Permalink: https://lccn.loc.gov/sh85147133

HEADING: Wit and humor, Juvenile

000 00915cz a2200229n 450

001 4795385

005 20190825061543.0

008 860211|| anannbabn |b ana

010 __ |**a** sh 85147133

035 __ |**a** (DLC)sh 85147133

035 __ |**a** (DLC)142070

040 __ |**a** DLC |**c** DLC |**d** DLC

150 __ |**a** Wit and humor, Juvenile

360 __ |**i** subdivision |**a** Juvenile humor |**i** under names of countries, cities, etc., names of individual persons and corporate bodies, and under classes of persons, ethnic groups, names of deities and mythological or legendary figures, individual and groups of fictitious and legendary characters, and topical headings

450 __ |**a** Children’s wit and humor

450 __ |**a** Juvenile humor

450 __ |**a** Juvenile wit and humor

450 __ |**a** Wit and humor |**v** Juvenile literature

906 __ |**t** 9628 |**u** te03 |**v** 0

910 __ |**a** Proposal saved by tc15 on 07/24/2018 at 08:37:34

953 __ |**a** xx00 |**b** ta27

906 __ |**t** 1807 |**v** 0

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ATTACHMENT 4I

LC control no.: sh 85023721

LCCN Permalink: https://lccn.loc.gov/sh85023721

HEADING: Children’s poetry

000 00944cz a2200253n 450

001 4676180

005 20190825061640.0

008 860211 | anannbabn |b ana

010 __ |**a** sh 85023721

035 __ |**a** (DLC)sh 85023721

035 __ |**a** (DLC)22865

040 __ |**a** DLC |**c** DLC |**d** DLC

053 _0 |**a** PN6109.97

150 __ |**a** Children’s poetry

360 __ |**i** subdivision |**a** Juvenile poetry |**i** under names of countries, cities, etc., names of individual persons and corporate bodies, and under classes of persons, ethnic groups, names of deities and mythological or legendary figures, individual and groups of fictitious and legendary characters, and topical headings

450 __ |**a** Juvenile poetry

450 __ |**a** Poetry for children

550 __ |**w** g |**a** Children’s literature

550 __ |**w** g |**a** Poetry

550 __ |**a** Poetry and children

906 __ |**t** 9628 |**u** te03 |**v** 0

910 __ |**a** Proposal saved by tc03 on 11/28/2018 at 11:57:29

953 __ |**a** xx00 |**b** ta27

906 __ |**t** 1811 |**v** 0

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ATTACHMENT 4J

LIBRARY OF CONGRESS AUTHORITIES

LC control no.: sh 85023784
LCCN Permalink: https://lccn.loc.gov/sh85023784
HEADING: Children’s stories, American

000 00429cz a2200169n 450
001 4676243
005 20120322080927.0
008 860211i| anannbabn |a ana
010 __ |**a** sh 85023784
035 __ |**a** (DLC)sh 85023784
035 __ |**a** (DLC)22928
040 __ |**a** DLC |**c** DLC |**d** DLC
150 __ |**a** Children’s stories, American
450 __ |**a** American children’s stories
550 __ |**w** g |**a** American fiction
906 __ |**t** 8114 |**u** ---- |**v** 0
953 __ |**a** xx00 |**b** fk02

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ATTACHMENT 4K

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Public Catalog

Copyright Catalog (1978 to present) at DC4
Search Request: Left Anchored Title = cat in the hat
Search Results: Displaying 1 of 343 entries

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Labeled View

The Cat in the hat. By Doctor Seuss, pseud. of Theodor S. Geisel.

Type of Work: Text
Registration Number / Date: RE0000240391 / 1985-01-31
Renewal registration for: A00000281039 / 1957-02-28
Title: The Cat in the hat. By Doctor Seuss, pseud. of Theodor S. Geisel.
Copyright Claimant: Theodor S. Geisel (A)
Variant title: The Cat in the hat.
Names: Geisel, Theodor Seuss, 1904-
Doctor Seuss, pseud.
Seuss, Doctor, pseud.

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ATTACHMENT 5

CURRICULUM VITAE SYLVIA D. HALL-ELLIS

EDUCATION

Ph.D., University of Pittsburgh, Pittsburgh, Pennsylvania, 1985
M.P.S., University of Denver, Denver, Colorado, 2014
Post Graduate Studies, University of Texas – San Antonio, Texas, 1975-1976
M.L.S., University of North Texas, Denton, Texas, 1972
B.A., Rockford University, Rockford, Illinois, 1971

PROFESSIONAL EXPERIENCE

1981- **Consultant for higher education, non-profit organizations, and corporations.**

2002- **Adjunct Professor, School of Information, San José State University, San José, California.** Serve as part-time faculty member teaching graduate students in technical services (cataloging, bibliographic control, classification), "core courses," and special topics.

2014-2016 **Director, Grants and Resource Development, Colorado Community College System.** Provided leadership and vision to foster the continued growth of rigorous scholarship, innovative projects, and creative work for statewide system, 13 campuses, and 50 teaching sites serving 155,000 students. Responsible for leadership and ensured efficient functioning of contract and grants in compliance with state & federal requirements and successful implementation and management. Served as a subject matter expert and liaison for college Grant Directors for all issues relating to grants and subcontracts.

2010-2014 **Senior Grant Administrator, Morgridge College of Education, University of Denver (Colorado).** Provided leadership and vision to foster continued growth of rigorous scholarship, innovative research, and creative work in the Morgridge College of Education. Ensure that contract and grants processes function effectively and efficiently for 60 faculty and researchers with a focus on the successful progression and efficient management of grants totaling $13M. Worked effectively and collegially with Department Chairs and Program Coordinators on operational grant-related management activities and with a broad range of internal and external constituencies. Supported the dissemination and promotion of faculty research and scholarship to outside constituents at conferences and through publications. Assisted Principal Investigators and grant project teams by coaching, mentoring, and financial management.

2011-2013 **Interim Director & Assistant Dean, Westminster Law Library, Sturm College of Law, University of Denver.** Planned, organized, and directed all administrative activities for the library serving students, faculty, and alumni; oversaw the employment, retention, promotion, transfer and termination of library personnel; represented the library at professional conferences and public meetings; created and promoted a climate and culture of acceptance for new programs and services, a positive high-quality image of the law library, and that reflect the organization's values, encourage excellent performance, and reward high productivity and innovation; provided leadership and set strategic direction of the organization; ensured that the library provided excellent customer service through solution-oriented staff response to patron needs and by responsiveness and continuous improvement of the organization; promoted, developed, and maintained positive working relationships with colleagues and customers including key stakeholders and groups, higher education institutions, the legal community, other regional libraries and districts statewide, and national library organizations.

2007-2014 **Associate Professor, Library & Information Science, Morgridge College of Education, University of Denver (Colorado).** Served in leadership role and worked collaboratively in program, college, campus and community environments. Advised and supervised students, taught core and specialized courses at the graduate level in an integrative, student-centered learning environment. Served on LIS, College, and University committees, and maintained working relationships with colleagues in other academic units and information professionals in the Rocky Mountain region and beyond. Served on and chair doctoral student dissertation committees. Oversaw and facilitated the College and LIS graduate student association.

2002-2007 **Assistant Professor, Library & Information Science, College of Education, University of Denver (Colorado).** Served as tenure-track faculty member teaching graduate students in "core courses," resource description and access, service learning, and independent studies. Advised graduate students, participate on LIS and College committees, and serve on doctoral student dissertation committees. Oversaw and facilitated the LIS graduate student association and alumni association.

2000-2002 **Affiliate Faculty, Library & Information Science, College of Education, University of Denver (Colorado).** Served as part-time faculty member teaching graduate students in technical services (cataloging, bibliographic control, classification), "core courses," and special topics. Oversaw and facilitated the LIS graduate student association and alumni association.

2000-2001 **Special Assistant to the Secretary's Regional Representative, U.S. Department of Education, Region VIII, Denver, Colorado.** Served as the principal advisor and representative of the U. S. Secretary of Education's Regional Representative (SRR). Ensured the implementation of major goals of the SRR and the Secretary. Provided leadership on behalf of the SRR in contacts with high-level officials in Region VIII requiring sensitive policy interpretation in communication with senior Department officials to solve problems and resolve issues raised by State and local education officials. Served as the primary contact for School-to-Work/Career, Children's Health Insurance Program, and Safe and Drug-Free Schools. Delivered technical assistance to local education agencies and institutions of higher education in technology, professional development, and school construction.

1999-2000 **Catalog Librarian, Jefferson County Public Library, Lakewood, Colorado.** Performed original, copy cataloging and classification of library materials (English and Spanish) using standard library protocols; completed original descriptive cataloging and subject analysis; enhanced brief catalog and authority records in III.

1997-1999 **Development Officer, McREL International, Aurora, Colorado.** Served as senior member of corporate management team in strategic planning, development of proposals and contracts, implementation, and evaluation of new services, products, and programs for educational agencies. Provided creative leadership to corporate committees to solicit ideas, identify goals and objectives, plan, develop, present, and evaluate professional development opportunities.

1995-1997 **Education Specialist, Education Service Center, Region One, Edinburg, Texas.** Served as member of Administrative Cabinet team in strategic planning, development of proposals and contracts, implementation, and evaluation of telecommunications capabilities, services, products, and programs for 40 school districts serving 283,000 students in 7 counties. Provided creative leadership to regional and state committees to solicit ideas, identify strategic goals and objectives, plan, develop, present, and evaluate funding opportunities and professional development for 400 librarians.

1993-1996 **Assistant Professor of Library Science, Sam Houston State University, Huntsville, Texas.** Served a faculty member teaching 400 graduate students in technical services (cataloging, bibliographic control, classification), automation, and networking. Participated in distance education program and coordinated annual conference. Conducted university and Texas Library Association-funded field research focused on library collection development and academic achievement.

1992-1993 **Head Librarian, Rocky Mountain College of Art & Design, Denver, Colorado.** Responsible for the daily operation, selection and acquisition of materials, formulation of policies for library operations, media center, and photography/slides archives. Designed and implemented library automation and delivery of electronic resources to college community.

1981-1985 **Development Officer, PRLC, Inc., Pittsburgh, Pennsylvania.** Served as senior member of corporate management team in strategic planning, development of proposals and contracts, implementation, and evaluation of new services, products, and programs for 100 institutional member organizations. Coordinated the development of proposals and contracts totaling $4,000,000 annually. Provided creative leadership to corporate committees to solicit ideas, identify goals and objectives, plan, develop, present, and evaluate professional development opportunities.

1981 **Director of Library Development, Pennsylvania Department of Education, Harrisburg, Pennsylvania.** Responsible for statewide development, technical assistance, professional development, resource sharing, children's services, institutional library services, networking, and state aid program for all libraries throughout the Commonwealth. Functioned as liaison to Governor's Advisory Council, LSCA Advisory Council, District Administrators, private colleges, universities, consortia managers, and network directors. Supervised $14,000,000 formula-based state aid program and $3,000,000 grant awards to individual libraries, consortia, and networks.

1978-1981 **Assistant Director, Southern Tier Library System, Corning, New York.** Coordinated operation of system-wide programs (technical assistance, professional development, resource sharing, technical services, outreach) to 40 public libraries in 5 counties serving 500,000 residents. Solicited ideas, identified goals, sponsored, and evaluated professional development opportunities and technical assistance sessions.

1976-1978 **Division Librarian for Technical Services, Corpus Christi Public Libraries, Corpus Christi, Texas.** Provided leadership in acquisitions, cataloging, serials control, and processing for main library and 4 branches serving 250,000 residents. Participated as senior member of library management team. Compiled and prepared technical evaluations, reports, and statistical analyses of Division operations to measure the achievement and cost of annual goals, objectives, and staff performance.

1975-1976 **System Coordinator, San Antonio Major Resource Center, San Antonio, Texas.** Served as senior member of the management team for District X Office, charged to provide technical assistance, resource sharing, media services, and professional development to librarians and staff representing 30 public library jurisdictions in 21 counties serving 1,500,000 residents. Functioned as liaison to System Director, staff, and members of governing bodies with the System Board of Directors and the Texas State Library and Historical Commission. Prepared LSCA grant applications and monitored awards totaling $1,100,000 annually.

1973-1975 **Bilingual Branch Librarian, San Antonio Public Library, San Antonio, Texas.** Worked as librarian providing reference, information, and readers' advisory services in branch serving 50,000 Spanish-speaking residents in southwest San Antonio. Participated in collection development and resource acquisition activities, specializing in children's work, Spanish language resources, and multicultural studies.

1972-1973 **Librarian, Holding Institute, Laredo, Texas.** Worked as high school librarian serving 500 boarding students in Spanish-speaking environment of private school. Provided reference, research assistance, and library instruction to students and 35 faculty members.

1966-1971 **Rockford Public Library, Rockford, Illinois.** Worked in branches as part-time as a Library Assistant, Clerk, and Page in city library serving 150,000 residents.

PUBLICATIONS

Editor-reviewed Monographs (Completed and in Progress)

Hall-Ellis, Sylvia D., and Mary Bolin. *Contemporary Cataloging in an RDA Environment: A Handbook for Students and Practitioners.* Chicago, IL: American Library Association. Under contract & In development.

RDA Testing: Lessons Learned and Challenges Revealed. Sylvia D. Hall-Ellis and Robert O. Ellett, Jr., eds. Binghamton, N.Y.: Haworth, 2012. 128 p.

Hall-Ellis, Sylvia D., Stacey L. Bowers, Christopher D. Hudson, and M. Claire Williamson. *Librarian's Handbook for Seeking, Writing, and Managing Grants.* Santa Barbara, Calif.: Libraries Unlimited, 2011. 315 p.

Hall-Ellis, Sylvia D., with Ann Jerabek, and Merrie W. Valliant. *Contemporary Cataloging: A Handbook for Practitioners and Students.* Open access text. Athens, GA: University of Georgia System Regents, 2011. 767 p.

Grealy, Deborah S. and Sylvia D. Hall-Ellis. *From Research to Practice: The Scholarship of Teaching and Learning in LIS Education.* Westport, Conn.: Libraries Unlimited, 2009. 175 p.

Hall-Ellis, Sylvia D. with J. Ann Jerabek. *Grants for School Libraries.* Westport, Conn.: Libraries Unlimited, 2003. 197 p.

Hall-Ellis, Sylvia D., Doris Meyer, Frank W. Hoffmann, with J. Ann Jerabek. *Grant Writing for Small Libraries and School Library Media Centers.* Boulder, Colo.: NetLibrary, 2001. 173 p.

Hall-Ellis, Sylvia D., Doris Meyer, Frank W. Hoffmann, with J. Ann Jerabek. *Grant Writing for Small Libraries and School Library Media Centers.* Englewood, Colo: Libraries Unlimited, 2000. 173 p.

Editor-reviewed Chapters (Completed and In Progress)

Hall-Ellis, Sylvia D. "Prepared to Lead: Talent, Skills, and Competencies." In *Telling the Technical Services Story*. Chicago, IL: American Library Association, 2020. Program Presentation for Re-Accreditation by the American Library Association, School of Information, San Jose State University, 2022.

Hall-Ellis, Sylvia D. "Grant Writing and Sponsored Research Funding for Academic Librarians." In *The New Librarianship.* Vol. 4. Bradford Lee Eden, ed. New York: Scarecrow Press, 2015. (pp. 163-174)

Hall-Ellis, Sylvia D. "Organizing Information: Technical Services." In *Information Services Today: An Introduction.* Sandra Hirsch, ed. Lantham, Md.: Rowman and Littlefield, 2015. (pp. 139-148)

Hall-Ellis, Sylvia D. "Metadata, MARC, and More." In *Rethinking Technical Services, Considering Our Profession and Ourselves: What's the Future of Our Profession?* Mary Beth Weber, ed. Lantham, Md.: Rowman and Littlefield, 2015. (pp. 29-55)

Hall-Ellis, Sylvia D., ed. "Contingent Faculty: Non-Tenure Track Faculty Series." In the *Faculty Personnel Guidelines Relating to Appointment, Promotion, and Tenure.* November 2011. Denver, Colo.: University of Denver, 2011. 42 p.

Hall-Ellis, Sylvia D., ed. "Standard VII: Information Resources." In the *Sturm College of Law Self-Study Presentation for Accreditation by the American Bar Association.* Denver, Colo.: University of Denver, Sturm College of Law, 2011. 20 p.

Hall-Ellis, Sylvia D. "Applying for Grants from Foundations, Corporations, or Government." In *The Volunteers' Guide to Fundraising: Raise Money for Your School Team, Library or Community Group.* 1st ed. Ilona M. Bray, ed. Berkeley, Calif.: Nolo, 2011. (pp. 1-38 on accompanying disc)

Hall-Ellis, Sylvia D., ed. "Standard III: The Faculty." In the *Library and Information Science Program Self-Study Document for Accreditation by the American Library Association.* Denver, Colo.: University of Denver, Morgridge College of Education, 2010. 22 p.

Hall-Ellis, Sylvia D. "Library and Information Science Programs and Education for Catalogers and Metadata Specialists: Challenges for the Twenty-first Century." In *Conversations with Catalogers in the Twenty-First Century.* Elaine R. Sanchez, ed. Santa Barbara, Calif.: ABC-Clio, 2010. (pp. 226-254)

Hall-Ellis, Sylvia D., ed. "Standard III: The Faculty." In the *Library and Information Science Program Self-Study Document for Accreditation by the American Library Association.* Denver, Colo.: University of Denver, College of Education, 2003. 15 p.

Lesesne, Teri S. and Sylvia D. Hall-Ellis. "The Selection, Evaluation, and Integration of Culturally Authentic Texts: A Case for Making the Online Catalog Reflect Parallel Cultures." In *Literacy: Traditional, Cultural, Technological.* Pittsburgh, Pa.: International Association of School Librarianship, 1995. (pp. 110-113)

Lesesne, Teri S. and Sylvia D. Hall-Ellis. *The Selection, Evaluation, and Integration of Culturally Authentic Texts: A Case for Making the Online Catalog Reflect Parallel Cultures.* In *Conference Proceedings* of the 23rd Annual International Association of School Librarianship, Pittsburgh, Pennsylvania, July 17-22, 1994. ERIC Document ED374816. 17 p.

Hall-Ellis, Sylvia D. "Curriculum Folio for School Library Media Specialist Programs." In the *National Council for Accreditation of Teacher Education Self-Study for Sam Houston State University.* Huntsville, Tex.: Sam Houston State University, College of Education and Applied Science, 1994. 25 p.

Bruntjen, Scott and Sylvia D. Hall. "Attempting to Automate: Lessons Learned Over Five Years." In *Advances in Library Administration*. Volume 4. Weston, Conn.: JAI Press, 1985. (pp. 177-192)

Peer-Reviewed Journal Articles (Completed and In Progress)

Hall-Ellis-Sylvia D. "Job Design for Cataloging and Metadata Librarians." Submitted to *Journal of Library Administration.* In progress.

Hall-Ellis, Sylvia D. "The Relationship of Situational Leadership and the Dreyfus Model of Skill Acquisition for Supervisors in Cataloging and Metadata Services." To be submitted to *Library Resources and Technical Services.* In progress.

Hall-Ellis, Sylvia D. *The Relationship of Core Competencies on Learning Outcomes and Employers' Expectations for Catalog Librarians and Metadata Specialists.* To be submitted to the *Journal of Education for Library and Information Science.* In progress.

Hall-Ellis, Sylvia D. "Building Cataloger Competencies: The Dreyfus Model as a Prototype for the Education and Professional Development of Catalog Librarians and Metadata Specialists in Bibliographic Control." To be submitted to the *Cataloging & Classification Quarterly.* In progress.

Hall-Ellis, Sylvia D. "Descriptive Impressions of Entry-Level Cataloger and Metadata Specialists Positions, 2000-2016: Reflections and Trends." To be submitted to *Library Resources and Technical Services.* In progress.

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Hall-Ellis, Sylvia D. "Stackable Micro-credentials – A Framework for the Future." *The Bottom Line 29*, no. 4 (April 2016), http://www.emeraldinsight.com/doi/pdfplus/10.1108/BL-02-2016-0006
Ellis, Sylvia D. "Succession Planning and Staff Development – A Winning Combination." *The Bottom Line*, 28 no. 3 (May 2015): 95-98.

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Hall-Ellis, Sylvia D. "Metadata Competencies for Entry-Level Positions: What Employers Expect as Reflected in Position Descriptions, 2000-2013." *Journal of Library Metadata 15*, no. 2 (June 2015): 102-134.

Hall-Ellis, Sylvia D. "Onboarding to Improve Library Retention and Productivity." *The Bottom Line 27*, no. 4 (October 2014).

Hall-Ellis, Sylvia D. "Accept, Coach, and Inspire: A Formula for Success." *The Bottom Line 27*, no. 3 (July 2014): 103-106.

Hall-Ellis, Sylvia D. *Reward Systems for Staff in Higher Education Institutions: Case Studies of 15 Higher Education Institutions in Colorado.* Capstone Thesis. Denver, Colo.: University of Denver, University College, 2014.

Hall-Ellis, Sylvia D. "Reward Systems Promote High-Performance Work Teams Achieving Library Mission." *The Bottom Line 27*, no. 2 (April 2014): 66-69.

Hall-Ellis, Sylvia D. "Investment in Staff Development for Seeking External Grant Funds." *The Bottom Line 27*, no. 1 (January 2014): 22-25.

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Hall-Ellis, Sylvia D. and Deborah S. Grealy. "Service Learning in LIS Education: A Case for Holistic Assessment." *Catholic Library World* 82, no. 3 (March 2012): 178-187.

Hall-Ellis, Sylvia D., and Deborah S. Grealy. "The Dreyfus Model of Skill Acquisition: A Career Development Framework for Succession Planning and Management in Academic Libraries." *College and Research Libraries* (June 2012). http://crl.acrl.org/content/early/2012/06/19/crl12-349.full.pdf+html

Hall-Ellis, Sylvia D. "Cataloger Competencies…What Do Employers Require?" *Cataloging & Classification Quarterly* 46, no. 3 (2008): 305-330. http://ccq.haworthpress.com/doi:10.1080/01639370802034565

Hall-Ellis, Sylvia D. "Subject Access for Readers' Advisory Services: Their Impact on Contemporary Spanish Fiction in Selected Public Library Collections." *Public Library Quarterly* 27, no.1 (2007): 1-18. http://plq.haworthpress.com/doi:10.1080/01616840802122377

Hall-Ellis, Sylvia D. "Language Proficiencies among Catalogers and Technical Services Librarians." *Technical Services Quarterly* 25, no. 2 (2007) 31-47. http://tsq.haworthpress.com/doi:10.1300/J124v25n02_03

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Hall-Ellis, Sylvia D. and Duan Zhang. *Project Homeless Connect 5 Event Evaluation.* Denver, Colo.: Center for Community Engagement and Service Learning, 2008.

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Developing a Compensation Plan for Your Library. Paula M. Singer and Laura L. Francisco, comps. 2nd ed. Chicago, IL: American Library Association, 2009. 978-0-8389-0985-0, $57.00 [*Colorado Libraries,* March 2012]

Frugal Librarian. Carol Smallwood, ed. Chicago, IL: American Library Association, 2011. 978-0-83891-075-7, $42.00 [*Colorado Libraries,* February 2012]

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Littauer, Marita, and Florence Littauer. *Enriquece tu Comunicación. Miami, Fla.: Editorial Unilit, 2008.* 978-0-7899-1521-4, $11.99 [*Críticas*, August 2008]

Martínez, Guillermo. *La Muerte Lenta de Luciana B.* New York: Rayo Planeta, 2008. 978-0-06-156551-9, $14.95 [*Críticas*, May 2008]

Matthews, Joseph R. *The Evaluation and Measurement of Library Services.* Westport, Conn.: Libraries Unlimited, 2007. 978-1-59158-532-9, $50.00 [*Colorado Libraries,* April 2008]

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Matthews, Joseph R. *Library Assessment in Higher Education.* Westport, Conn.: Libraries Unlimited, 2007. 978-1-59158-531-2, $45.00 [*Colorado Libraries,* February 2008]

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Alponte, Juan María. *Colón: el Hombre, el Navegante, la Leyenda.* México, D.F.: Aguilar, 2003. 968-19-1260-8, $16.95 [*Críticas*, 2004]

Olcese Salvatecci, Alfieri. *Cómo Estudiar con Èxito: Téchnicas yHhábitos Para Aprender Major.* México, D.F.: Alfaomega Grupo Editor, 2002. 970-15-0764-9 [*Críticas*, 2003]

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Tibol, Raquel. *Los Murales de Diego Rivera: Universidad Autónoma Chapingo.* México, D.F.: Editorial RM, Universidad Autónoma Chapingo, 2002. 968-5208-08-5 [*Críticas*, 2003]

Lindsay-Poland, John. *Emperors in the Jungle: the Hidden History of the U.S. in Panama.* Durham, N.C.: Duke University Press, 2003. 0-8223-3098-9, $18.95 [*Críticas*, 2003]

Kaplan, Allison G. and Ann Marlowe Riedling. *Catalog It! A Guide to Cataloging School Library Materials.* Worthington, Ohio: Linworth Pub., 2002. 1-58683-014-7, $44.95 [*Colorado Libraries,* 2002]

Bardach, Ann Louise. *Cuba Confidential: Love and Vengeance in Miami and Havana.* New York: Random, 2002. 0-375-50489-3, $25.95 [*Library Journal*, 2002]

Swan, James. *Fundraising for Libraries: 25 Proven Ways to Get More Money for Your Library.* New York: Neal Schuman, 2002. 1-55570-433-6, $69.95 [*Colorado Libraries,* 2002]

Puíg de Lange, Victoria. *Sol Con Agua.* Nashville, Tenn.: Editorial Vistazo/Ediciones Reio Negro, 2002. 0-9724506-0-2, $17.75 [*Críticas*, 2002]

The Encyclopedia of Latin American Politics. Edited by Diana Kapiszewski; assistant editor, Alexander Kazan. Westport, Conn.: Oryx Press, 2002. 1-57356-306-4, $74.95 [*Library Journal*, 2002]

Vargas Lizano, Isabel. *Y Si Quieres Saber de Mi Pasado.* Con la colaboración de J.C. Vales. Madrid: Santillana Ediciones Generales, S.L., 2002. 84-03-09278-4, $18.95 [*Críticas*, 2002]

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Cooper, Gail and Garry Cooper. *New Virtual Field Trips.* Englewood, Colo.: Libraries Unlimited, 2001. 1-56308-887-8, $27.50 [*Colorado Libraries,* 2001]

NATIONAL SERVICE & PROFESSIONAL AFFILIATIONS

American Library Association, Life Member

Association for Library Collections & Technical Services (now CORE)
Cataloging, Classification, and Metadata Section
Margaret Mann Citation Committee, 2023-
ALCTS Editorial Board, Member, 2015-2019
Committee on Cataloging: Description and Access, Member, 2008-2012
Test Site for RDA, Manager, 2009-2011
Nominating Committee, Member, 2007-2008
Committee for Education and Training of Catalogers, Chair, 2006-2007, Member, 2003-2007
Competencies & Education for a Career in Cataloging Interest Group, Chair, 2010-2012; Member, 2010-
President's Program Committee, 2015-2016
Education Committee, Member, 2005-2007
Task Force on Competencies and Education for a Career in Cataloging, Chair, 2007-2009
2007 Annual Meeting Pre-conference, "What They Don't Teach in Library School: Competencies, Education and Employer Expectations for a Career in Cataloging," Steering Committee Chair
Fundraising Committee, Member, 2004-2006
Office of Diversity
Committee on Diversity, Chair, 2010-2011
Diversity Research Advisory Committee, Member, 2009-2010
Spectrum Scholar Mentor, 2009
Diversity Grants Review Committee, Member, 2007, 2010, 2012
Office of Statistics and Research
Research and Statistics Committee, Member, 2005-2007; Intern, 2003-2005
Library Research Round Table
Nominating Committee, 2022-2023
Membership Committee, 2019-2021
Board of Directors, Member At-Large, 2009-2012
Office of Accreditation
Accreditation Panel Member (training completed 2004)
Accreditation Review Panel Member (training completed 2004)

REFORMA, Life Member

National Board of Directors, 2005-2013
National Fundraising Chair, 2005-2013
National Recruiting and Mentoring Committee, 2008-2010
Colorado Chapter, Secretary, 2004-2005
Colorado Chapter Liaison to National Board of Directors, 2004-2013

American Association of Law Libraries (AALL), Life Member Online Audiovisual Catalogers Association (OLAC) Colorado Association of Law Librarians (CoALL)

American Association of University Women Association for Library and Information Science Education (ALISE)

University of Denver ALISE Representative, 2003-2008; 2010-2011
Membership Advisory Committee, 2007-2010
Technical Services Education Special Interest Group, 2003-
Garfield Doctoral Dissertation Award Reviewer, 2012
Garfield Doctoral Dissertation Scholarship Reviewer, 2014

American Association of University Professors (AAUP), 2006-

American Grant Writers Association, 2014- Grant Professionals Institute, 2016- National Grants Management Association, 2014-
Grant Reviewer (National and Regional Team Leader), U.S. Department of Education, 1998- Grant Reviewer, Broadband Technologies Opportunity Program, U.S. Department of Commerce, 2009
Grant Reviewer, Institute of Museum and Library Services, 1998-2000
Grant Reviewer, Colorado Department of Education, 2014-
Grant Reviewer, Colorado State Library, 1998-
Grant Reviewer, American Association of Community Colleges *Working Connections* program, 1999
Peer Reviewer, *Journal for Library and Information Science Education,* 2005-
Peer Reviewer, *Journal of Library Metadata,* 2009
Peer Reviewer, *International Journal of Library and Information Science,* 2011
Regular Columnist, *The Bottom Line*, 2013-2016
Book Reviewer, *Library Journal*, 2001
Book Reviewer, *Críticas*, 2002-2009
Book Reviewer, *Colorado Libraries,* 2000-2012

REGIONAL SERVICE & PROFESSIONAL AFFILIATIONS

Mountain Plains Library Association
Professional Development Grants Committee, Member, 2005-2006
Professional Development Policy and Guidelines Sub-committee Chair, 2006

Colorado Association of Libraries
"Student Voices" Column Editor, *Colorado Libraries,* 2005-2006
Conference Planning Committee, Member, 2002
Technical Services and Automation Division, Chair, 2002-2003; Member, 2000-
Academic Libraries Division, Peer Review Conference Papers Committee, Member, 2007-2009
Education Committee, Member, 1988-1993
Diverse Populations Committee, Member, 2009-2013

SERVICE TO THE UNIVERSITY OF DENVER
Center for Teaching and Learning Faculty Advisory Board, 2007-2008; 2010-2012
Center for Community Engagement and Service Learning Advisory Board, 2007-2012
Faculty Senate
Executive Committee, 2008-2013
Nominations, Rules & Credentials Committee, Chair, 2008-2013; Member 2007-2013
Appointment, Promotion, and Tenure Revision Committee, 2010-2012
Grievance Policy Committee Member, 2007-2010
Law Library Director Search Committee Chair, 2012-2013
PROF Grant Review, College Representative to the University Review Team, 2006, 2008
Project Homeless Connect Evaluations, Principal Investigator, 2006-2009
University Technology Council, 2007-2009
University of Denver Hyde Interviews for Incoming Freshmen, 2003-2012

SERVICE TO THE MORGRIDGE COLLEGE OF EDUCATION
Appointment, Tenure & Review Committee
Member, voting, 2003-2005; 2007- 2009
Chair, Clinical Faculty Promotion & Tenure Policy Subcommittee, 2008-2009
Member, Community Engagement Subcommittee, 2007-2009
Member, Tenure Review Panel, 2003
Advancement and Alumni Relations Committee, Chair, 2003-2007; Member, 2002-2007
College Building Committee Member, 2004-2010

College of Education Student Association, Faculty Advisor, 2004-2007; 2009-2010
Faculty Senator, 2007-2013
Research and Scholarship Committee, Chair, 2008-2009; Member, 2002-2003, 2008-2009
Research and Grant Mentoring Committee, Chair, 2009-2010
Research Task Force Member, 2010-2012
Search Committee Member, Assistant Professor for Curriculum & Instruction, 2010-2011
Workload Task Force Member, 2010-2011

SERVICE TO THE LIBRARY & INFORMATION SCIENCE PROGRAM

Library and Information Science Student and Alumni Association, Faculty Advisor, 2002-2008
ALA Student Chapter, Faculty Advisor, 2005-2008
Beta Phi Mu Phi Chapter, Faculty Advisor, 2004-2014
Steering Committee Member, Accreditation by the American Library Association, 2001-2004
Search Committee Member, Associate Professor for LIS, 2006
Search Committee Chair, Assistant Professors for LIS, 2003, 2005, 2006, 2007
Search Committee Ex-Officio Member, Director for LIS, 2004

SERVICE TO SAM HOUSTON STATE UNIVERSITY

Rio Roundup: South Texas Literature Conference, Conference Coordinator, 1993
External Relations, Fund Raising, Grants Committee, Chair, 1993-1995
Advisory Council Committee, Chair, 1993-1995
Students, Admissions, and Advisement Committee, Chair, 1994
Institutional Effectiveness Committee, Member, 1993-1995

SERVICE TO THE COLLEGE OF EDUCATION AND APPLIED SCIENCE

Faculty Affairs Committee, Member, 1993-1995
Curriculum Committee, Member, 1993-1995
Continuing Education Committee, Member, 1993-1995

SERVICE TO THE COMMUNITY

French Teacher & Student Exchange with Laon, France, Monarch High School, Boulder Valley School District (Boulder, Colorado), 2017-
Denver/Boulder Games 2022, Board of Directors, Secretary-Treasurer, 2015-2018
United Way Campaign Committee, College of Education, 2006
Arapahoe County, Election Judge for the County Clerk and Recorder, 2000-2005
Arthritis Foundation, Rocky Mountain Chapter, Certified Educator & Trainer, 1999-2008
Bonfils Blood Center, Silver Level Donor, 2000-2016
Denver Museum of Natural History, Docent, 1992
Tech Prep of the Lower Rio Grande Valley, Inc. (Harlingen, Texas) Board of Directors, 1995-1997
Executive Committee, 1996-1997; Chair, Development Committee, 1995-1997; Chair, Fiscal Agency Committee, 1995-1996; Chair, Colleges and Universities Committee, 1996-1997
Gilpin County (Colorado) Public Library Board of Trustees, 1986-1989; Vice President, 1987-1989
City of Central (Colorado) Economic Development Committee, 1987-1989
Columbine Family Health Centers, Inc. (Nederland and Black Hawk, Colorado) Board of Directors, 1988-1989

CERTIFICATION

Permanent Public Librarian Certificate - Pennsylvania, New York, Texas
Westlaw Expert Witness, 2008-
Certified Grant Writer®, 2016-

AWARDS AND HONORS

Advanced Practitioner for Service Learning and Community Engagement, University of Denver, 2011
Platinum Star Alumnae, College of Information, Library Science & Technologies, University of North Texas, 2009
Commendation for Integration of Technologies in Teaching & Learning Environment, University of Denver, 2006
Outstanding Adjunct Faculty Member Award, College of Education, University of Denver, 2002
Beta Phi Mu, Pi, University of Pittsburgh, 1985
Alpha Lambda Sigma, University of North Texas, 1972
Albert Nelson Marquis Lifetime Achievement Award, Who's Who in America
Who's Who in American Women
Who's Who of Women Executives
Dictionary of International Biography
Who's Who in the East
Who's Who in the South and Southwest
Who's Who in the World
Who's Who of Online Professionals
Who's Who in Library and Information Science
2,000 Notable Women
Who's Who of Emerging Leaders
Who's Who in Professional and Executive Women
Who's Who in American Education
International Who's Who of Professional and Business Women
International Leaders in Achievement
International Educator of the Year
Who's Who in Finance and Industry
Who's Who in Finance and Business

Invited International and National Conference Presentations

Hall-Ellis, Sylvia D. *Presentation of the Robert O. Ellett Endowed Scholarship.* Presentation delivered to the School of Information at San Jose State University Alumni & Student Program, American Library Annal Conference, San Diego, Calif., June 29, 2024.

Driscoll, Margaret, Christy Confetti Higgins, Scott Brown, and Sylvia D. Hall-Ellis. *A View from Within: Open House Tour of Three Canvas Core Courses*. Presentation to be delivered at the School of Information, San José State University Professional Development Seminar, San José, California, October 17, 2019.

Hall-Ellis, Sylvia D. *Invest in Me -- I'm Your Future: Succession Planning for Libraries.* Keynote presentation delivered at the ALCTS President's Symposium, Boston, Mass., January 8, 2016.

Seidel, Kent E. and Sylvia D. Hall-Ellis. *Making Grants Work for You: Strategies for Doctoral Students and Early Career Scholars.* Presentation delivered at the University Council for Educational Administration, Early Career Scholars Session, Indianapolis, Ind., November 9, 2013.

Hall-Ellis, Sylvia D. *So You Want to be a Manager; Leadership Skills and Competencies for Technical Services Managers and Administrators.* Presentation delivered at the 138th Annual Conference, American Library Association, Chicago, Ill., June 29, 2013.

Seidel, Kent E., Karen S. Riley, Lyndsay Agans, Susan Korach, and Sylvia D. Hall-Ellis. *Making Grants Work for You (Instead of Just Working for Grants).* A panel discussion delivered at the University Council for Educational Administration, Early Career Scholars Session, Denver, Colo., November 17, 2012.

Hall-Ellis, Sylvia D. *After the Great TS Reorganization: The Westminster Law Library.* Presentation delivered at the 137th Annual Conference, American Library Association, Anaheim, Calif., June 23, 2012.

Hall-Ellis, Sylvia D. *Conversations with Catalogers in the 21st Century.* A panel discussion sponsored by the ALCTS Competencies for a Career in Cataloging Interest Group, delivered at the 137th Annual Conference, American Library Association, Anaheim, Calif., June 22, 2012.

Hall-Ellis, Sylvia D., moderator. *Mid-Career Leaders Program.* A panel discussion sponsored by the ALA Committee on Diversity delivered at the 136th Annual Conference, American Library Association, New Orleans, La., June 26, 2011.

Hall-Ellis, Sylvia D., moderator. *Diversity Town Hall.* A community conversation sponsored by the ALA Committee on Diversity delivered at the 136th Annual Conference, American Library Association, New Orleans, La., June 24, 2011.

LaBarre, Kathryn, Sylvia D. Hall-Ellis, Karen Anderson, Rick Hasenyager, Christopher Cronin, and Penny Baker. *Briefings from RDA Test Participants.* A panel discussion delivered at the Midwinter Conference, American Library Association, San Diego, Calif., January 7, 2011.

Miksa, Shawne, Marjorie Bloss, and Sylvia D. Hall-Ellis. *Educating the Next Generation of Catalogers: Teaching RDA.* A panel discussion delivered at the 97th Annual Conference, Association for Library and Information Science Education, San Diego, Calif., January 7, 2011.

Hall-Ellis, Sylvia D., Robert Maxwell, John Hostage, and George Prager. *RDA Panel: What Cataloging Managers Need to Know.* Presentation delivered at the 103rd Annual Conference, American Association of Law Librarians, Denver, Colo., July 12, 2010.

Hall-Ellis, Sylvia D. and Stacey L. Bowers. *Catalogers in the RDA Environment: Skill Sets, Expectations and Challenges.* Presentation delivered at the 103rd Annual Conference, American Association of Law Librarians, Denver, Colo., July 11, 2010.

Hall-Ellis, Sylvia D. *Comfortable in Your Cataloging and Metadata Specialist Skin? Or, So You Want to Hire a Cataloger.* Presentation delivered to the ALCTS Research Group at the 134th Annual Conference, American Library Association, Chicago, Ill., July 11, 2009.

Perez, Megan, Sylvia D. Hall-Ellis, and Denise Anthony. *From Novice to Expert: Collaboration for Succession Planning.* A "hot topic" presentation delivered at the 14th ACRL Conference, Seattle, Wash., March 13, 2009.

Hall-Ellis, Sylvia D. *Cataloging in the RDA Environment: Skill Sets, Expectations and Challenges.* Presentation delivered to the ALCTS Research and Publications Committee at the Midwinter Conference, American Library Association, Denver, Colo., January 24, 2009.

Hall-Ellis, Sylvia D. *LIS Cataloging Education for the 21st Century: Expectations and Challenges.* A panel discussion held at the 95th Annual Conference, Association for Library and Information Science Education, Denver, Colo., January 23, 2009.

Chu, Clara, Sylvia D. Hall-Ellis, and Mark Winston. *The Doctoral Degree & Building a Career.* A panel discussion delivered at the ALA Office of Diversity Spectrum Doctoral Fellows E.J. Josey Leadership Institute, Midwinter Conference, American Library Association, Denver, Colo., January 20, 2009.

Hall-Ellis, Sylvia D. and Robert O. Ellett, Jr. *Fundamentals of Cataloging Course: An Overview of the ALCTS Online Course.* Presentation delivered to the ALCTS Big Heads Group, 133rd Annual Conference, American Library Association, Anaheim, Calif., June 30, 2008.

Hall-Ellis, Sylvia D. *Employers' Expectations for Technical Services Librarians: What We Don't Know.* Presentation delivered to the ALCTS Research and Publications Committee Program, 133rd Annual Conference, American Library Association, Anaheim, Calif., June 28, 2008.

Hall-Ellis, Sylvia D., Virginia R. Maloney, and Mary Stansbury. *Institutional Responses to Engaged Scholarship: The Carnegie Foundation Engaged University Classification at Two Universities.* Presentation delivered to the 94th Annual Conference, Association for Library and Information Science Education, Philadelphia, Pa., January 11, 2008.

Hall-Ellis, Sylvia D. *Puzzles, Problems, and Predicaments.* Presentation delivered to the ALCTS Research Discussion Group, 132nd Annual Conference, American Library Association, Washington, D.C., June 23, 2007.

Hall-Ellis, Sylvia D. *Cataloging Education: A New Emphasis for the Library and Information Science Curriculum.* Presentation delivered to the ALCTS Pre-conference, 132nd Annual Conference, American Library Association, Washington, D.C., June 22, 2007. http://www.loc.gov/catdir/cpso/careercat.html

Ellett, Jr., Robert O. and Sylvia D. Hall-Ellis. *Copy Cataloging Done Smarter.* Presentation delivered to the International Conference on Interdisciplinary Information Sciences and Technologies (InSciT2006), October 25-28, 2006.

Hall-Ellis, Sylvia D. and Robert O. Ellett, Jr. *Cooperative Cataloging: Challenges and Opportunities for Defense Libraries.* Presentation delivered to the 1st Annual Conference of Defense Libraries, Spanish Ministry of Defense, Madrid, Spain, July 7, 2006.

Hall-Ellis, Sylvia D. *Cataloger Competencies: Do the Employers Require What the Professors Teach?* Presentation delivered to the ALCTS CCS Heads of Cataloging Discussion Group, 131st Annual Conference, American Library Association, New Orleans, La., June 26, 2006.

Grealy, Deborah S. and Sylvia D. Hall-Ellis. *From Research to Practice: The Scholarship of Teaching and Learning in LIS Education.* Presentation delivered to the at the 92nd Annual Conference, Association for Library and Information Science Education, San Antonio, Tex., January 18, 2006.

Hall-Ellis, Sylvia D. *Employers' Expectations for Entry-Level Catalogers: What Position Announcement Data Indicate.* Research paper delivered to the Technical Services Special Interests Group, 91st Annual Conference, Association for Library and Information Science Education, Boston, Mass., January 12, 2005. http://dlist.sir.arizona.edu/

Hall-Ellis, Sylvia D. *Common Errors in MARC Records Prepared by LIS Students: What Does It Mean?* Research paper delivered to the ALCTS CCS Cataloging Norms Discussion Group, Mid-Winter Conference, 90th American Library Association, San Diego, Calif., January 10, 2004.

Hall-Ellis, Sylvia D. *Visual Arts as Foundation for Successful Library Automation: The Rocky Mountain College of Art & Design Experience.* Paper delivered at the 6th Annual Conference of Higher Education, Charleston, S. C., 1993.

Hall, Sylvia D. *Design Elements for Bibliographic Databases: An Overview.* Paper delivered at the 14th Online National Conference, New York, 1983.

Invited Regional Conference Presentations

Hall-Ellis, Sylvia D., Hudson, Christopher D., Brittany Cronin, and Kathryn Michaels. "The Colorado Law Project: Meeting the Public's Need for Legal Information." Panel discussion delivered at the Mountain Plains Library Association Conference, Billings, Mont., April 9, 2011.

Grealy, Deborah S. and Sylvia D. Hall-Ellis. *Education for Information Professionals in New Mexico: Library & Information Science Graduate Education at the University of Denver.* Presentation delivered at the New Mexico Library Education Summit, Las Vegas, N.M., September 26, 2005.

Hall-Ellis, Sylvia D. *Public Library-School Library Partnerships.* Presentation delivered at the 3rd Annual Colorado Association of Libraries Conference with the Mountain Plains Library Association, Denver, Colo., October 22, 2004.

Hall-Ellis, Sylvia D. *Learn All You Can – Educational Partnership Opportunities for the Lewis and Clark Bicentennial Commemoration.* Paper delivered at the 3rd Annual Lewis and Clark Bicentennial Council National Planning Conference, Bismarck, N.D., April 26, 1998.

Invited State Conference Presentations

Grealy, Deborah S. and Sylvia D. Hall-Ellis. *Academic Library Leadership Changes: Using Succession Planning and Mentoring*. Presentation delivered at the Minnesota Library Education Conference, St. Cloud, Minn., October 10, 2013.

Hall-Ellis, Sylvia D., Merrie Valliant, and Melissa Powell. *RDA: What Is It and What Do You Need To Do With It At Your Library?* Presentation delivered at the Colorado Library Consortium Spring Conference, Ft. Morgan, Colo., April 26, 2013.

Hall-Ellis, Sylvia D. *Service Learning and the Library & Information Science Graduate Education at the University of Denver.* Presentation delivered at the 4th LEADS Scholars Orientation, Denver, Colo., August 5, 2009.

Hall-Ellis, Sylvia D. *Service Learning: Enhancement to Library & Information Science Graduate Education at the University of Denver.* Presentation delivered at the 3rd LEADS Scholars Orientation, Denver, Colo., June 2008.

Hall-Ellis, Sylvia D. *Law Librarianship: A Community Conversation.* Sponsored by the Colorado Association of Law Libraries. Paper delivered at the Colorado Supreme Court Library, Denver, Colo., May 14, 2008.

Hall-Ellis, Sylvia D. *Opportunities and Challenges in Law Librarianship: A Community Conversation.* Presentation delivered at the Sturm College of Law, Denver, Colo., November 7, 2007.

Ellis, Sylvia D. *Grant Writing Resources for Nursing Professionals.* Presentation delivered at the Presbyterian / St. Luke's Health One Medical Center 1st Annual Research Symposium, Denver, Colo., October 17, 2007.

Hall-Ellis, Sylvia D. *Project Homeless Connect 4 Event Evaluation – Insights and Lessons Learned.* Presentation delivered at the Homelessness Research Symposium: What is DU Doing about Homelessness in Denver, Denver, Colo., September 14, 2007.

Hall-Ellis, Sylvia D. *Service Learning and the Library & Information Science Graduate Education at the University of Denver.* Presentation delivered at the 2nd LEADS Scholars Orientation, Denver, Colo., August 10, 2007.

Hall-Ellis, Sylvia D. *Education for Information Professionals in a Digital Environment: Library & Information Science Graduate Education at the University of Denver.* Presentation delivered at the 15th Spring Mountains and Plains Parapros Conference, Denver, Colo., February 24, 2007.

Hall-Ellis, Sylvia D. *Public Library Service to Spanish-Speaking and Latino Residents in Denver: A Case Study.* Presentation delivered at the 4th Annual Colorado Association of Libraries Conference, Denver, Colo., November 10, 2005.

Hall-Ellis, Sylvia D. *Education for Information Professionals in a Digital Environment: Library & Information Science Graduate Education at the University of Denver.* Presentation delivered at the 14th Annual Mountains and Plains Parapros Conference, Aurora, Colo., July 29, 2005.

Hall-Ellis, Sylvia D. *Educational Opportunities: Library & Information Science Graduate Education at the University of Denver.* Presentation delivered at the 13th Annual Mountains and Plains Parapros Conference, Centennial, Colo., August 6, 2004.

Hall-Ellis, Sylvia D. *Library Education & Training: Focus on the West: An LIS Faculty Member's Personal Response*. Presentation delivered at the 1st Annual Colorado Association of Libraries Conference, Keystone, Colo., October 18, 2002.

Hall-Ellis, Sylvia D. *Grant Writing for School Librarians.* Presentation delivered at the 2002 Annual Colorado Education Media Association Conference, Colorado Springs, Colo., February 15, 2002.

Hall-Ellis, Sylvia D. *Grants – Opportunities for the Future.* Paper delivered at the Southeast Regional Accountability Annual Conference, Lamar, Colo., November 12, 1998.

Hall-Ellis, Sylvia D. *The Texas Library Connection and Interlibrary Loan: An Experiment in Resource Sharing.* Paper delivered at the Texas Computer Educators' Association Annual Conference, Austin, Tex., February 6, 1997.

Hall-Ellis, Sylvia D. *Finding Grant Sources on the Internet: A Guide for Librarians.* Paper delivered at the 2nd Annual Institute for School Library Personnel, Pharr-San Juan-Alamo North High School, Pharr, Tex., July 29, 1996.

Hall-Ellis, Sylvia D. *Mathematical and Logical Thinking: A Critical Intelligence.* Paper delivered at the 3rd Annual Paraprofessional Conference at the University of Texas - Pan American, Edinburg, Tex., March 8, 1996.

Hall-Ellis, Sylvia D. *Cataloging Trends and Issues: Update Session.* Paper delivered at the 1st Annual Institute for School Library Personnel, South Texas Community College, McAllen, Tex., July 19, 1995.

Hall-Ellis, Sylvia D. *Grant Writing: Tips and Encouragement for School Librarians.* Paper delivered at the 1st Annual Institute for School Library Personnel, South Texas Community College, McAllen, Tex., July 18 and 19, 1995.

Hall-Ellis, Sylvia D. *How to Become an Expert Grant Writer.* Paper delivered at the 3rd Annual High School Principals' Academy, South Padre Island, Port Isabel, Tex., June 19, 1995.

Texas Library Study: Results from Regions I and II. Paper delivered at the 3rd Annual Technology Conference, Texas A&M University, College Station, Tex., November 18, 1994.

Hall-Ellis, Sylvia D. *Academic Achievement and Middle School Students.* Paper delivered at the 8th Annual Young Adult Conference, Sam Houston State University, Huntsville, Tex., November 5, 1994.

Hall-Ellis, Sylvia D. *Multimedia Resources for Library Leaders.* Paper delivered at the Institute for Librarians in A Multicultural Environment, Sam Houston State University, Huntsville, Tex., June 10, 1994.

Hall-Ellis, Sylvia D. *Finding the Resource: Empowering the User, or, the Case for Curriculum Based Subject Access to Learning Resource Center Collections.* Paper delivered at the 81st Annual Texas Library Association Conference, Corpus Christi, Tex., April 12-16, 1994.

Hall-Ellis, Sylvia D. and William H. Pichette. *Sam Houston State University Makes Use of OCLC/AMIGOS Collection Analysis CD.* Paper delivered at the 81st Annual Texas Library Association Conference, Corpus Christi, Tex., April 12-16, 1994.

Hall, Sylvia D. *Funding and Library Development in Pennsylvania: A Symbiotic Relationship.* Paper delivered at the Annual Graduate Student Colloquia, University of Pittsburgh, School of Library and Information Science, 1982.

Hall, Sylvia D. *Leadership for Public Library Trustees.* Paper delivered for the Trustees Division, Pennsylvania Library Association Annual Conference, Lancaster, Penn., 1981.

Seminar and Professional Development Presentations

Taylor, Meredith, and Sylvia D. Hall-Ellis. *Talent Management and Succession Planning.* ALCTS eForum, held March 22, 2017.

Hirsh, Sandra, Heather O'Brien, Michelle Holschuh Simmons, Michael Krasulski, and Sylvia D. Hall-Ellis. *Information Services Today: An Introduction. Part 3: Information Services: Roles in the Digital Age*. Rowan and Littlefield in partnership with Library Journal webinar, recorded February 5, 2015.

Hall-Ellis, Sylvia D. and Jennifer Sweda. *Copy Cataloging in an RDA Environment.* ALCTS eForum, held May 14 and 15, 2013.

Hall-Ellis, Sylvia D. *Law Librarianship: A Community Conversation.* Sponsored by the Colorado Association of Law Libraries, presented at the Colorado Supreme Court Library, Denver, Colo., May 14, 2008.

Hall-Ellis, Sylvia D. and Beatrice Z. Gerrish. *Reading and Libraries: Recent Research in Reading.* Presentation at the Ricks Center for Gifted Education, Denver, Colo., March 4, 2008.

Hall-Ellis, Sylvia D. *Cataloger Competencies: Do the Employers Require What the Professors Teach?* Presentation for the School of Library and Information Science, San José State University, February 12, 2008.

Hall-Ellis, Sylvia D. and Robert O. Ellett, Jr. *Cooperative Cataloging: Rules, Tools, and Conventions for Building a Multi-institutional Catalog.* Sponsored for the Spanish Ministry of Defense, Madrid, Spain, July 10, 2006.

Hall-Ellis, Sylvia D. *Cash for Kids: Grant Writing Opportunities for Youth Services Librarians.* Sponsored by the Colorado Young Adult Librarians; presented at Bemis Memorial Library, Littleton, Colo., November 13, 2002.

Hall-Ellis, Sylvia D. *MARC Records and Authority Control: Planning for Bibliographic Database Migration.* Sponsored and held at the Douglas County Public Library, Castle Rock, Colo., May 28, 2002.

Grant Writing: A Refresher for Librarians. Sponsored by Library and Information Science Program, College of Education, University of Denver; presented at University Center at Chaparral, August 12, 2000.

Hall-Ellis, Sylvia D. *Shaking the Money Tree – Basic Grant Writing for Colorado Educators.* Sponsored by the Office of Educational Telecommunications of the Colorado Department of Education.
Pikes Peak Community College, Colorado Springs, Colo., November 16, 1998.

Pueblo School District 60, Pueblo, Colo., November 12, 1998.
University of Northern Colorado, Greeley, Colo., November 10, 1998.
United Technology Educational Partnership, Grand Junction, Colo., November 9, 1998.

Hall-Ellis, Sylvia D. *Cataloging Multimedia, Kits, Globes and Map Materials in USMARC.* Sponsored and hosted by Region One Education Service Center, Edinburg, Tex., April 24, 1997 and December 12, 1996.

Hall-Ellis, Sylvia D. *New Standards for School Library Media Centers.* Sponsored and hosted by Region One Education Service Center, Edinburg, Tex., April 15, 1997.

Hall-Ellis, Sylvia D. *The School Library Media Specialist in the 21st Century: Visions for the Future.* Sponsored and hosted by Pharr-San Juan-Alamo Independent School District, Pharr, Tex., April 4, 1997.

Hall-Ellis, Sylvia D. *Cataloging Sound Recordings and Audio Materials in USMARC.* Sponsored and hosted by Region One Education Service Center, Edinburg, Tex., March 20, 1997 and November 21, 1996.

Hall-Ellis, Sylvia D. *Evaluating and Selecting CD-ROMS for School Library Media Collections.* Sponsored and hosted by Region One Education Service Center, Edinburg, Tex., March 18, 1997.

Hall-Ellis, Sylvia D. *Cataloging Audiovisual Materials in USMARC.* Sponsored and hosted by Region One Education Service Center, Edinburg, Tex., February 27, 1997, November 7, 1996 and October 24, 1996.

Hall-Ellis, Sylvia D. *Introduction to Dialog: Basic Searching Strategies.* Sponsored and hosted by Region One Education Service Center, Edinburg, Tex., February 14, 1997.

Hall-Ellis, Sylvia D. *Cataloging Books in USMARC.* Sponsored and hosted by Region One Education Service Center, Edinburg, Tex., January 30, 1997, October 10, 1996, September 26, 1996 and August 8, 1996.

Hall-Ellis, Sylvia D. *Advanced Internet Searching Techniques for Librarians.* Sponsored and hosted by Region One Education Service Center, Edinburg, Tex., January 21, 1997.

Hall-Ellis, Sylvia D. *Texas Library Connection Full-Text Searching.* Sponsored and hosted by Region One Education Service Center, Edinburg, Tex., December 13, 1996 and October 25, 1996.

Hall-Ellis, Sylvia D. *Developing Evaluation Strategies for Grants and Proposals.* Sponsored and hosted by Region One Education Service Center, Edinburg, Tex., December 10, 1996.

Hall-Ellis, Sylvia D. *Developing Needs Assessment for Grants and Proposals.* Sponsored and hosted by Region One Education Service Center, Edinburg, Tex., November 12, 1996.

Hall-Ellis, Sylvia D. *Texas Library Connection Union Catalog Searching.* Sponsored and hosted by Region One Education Service Center, Edinburg, Tex., November 8, 1996 and September 6, 1996.

Hall-Ellis, Sylvia D. *Grant Resources on the Internet.* Sponsored and hosted by Region One Education Service Center, Edinburg, Tex., October 23, 1996.

Hall-Ellis, Sylvia D. *Preparing a Response to the Telecommunications Infrastructure Fund Board: Needs Assessment, Professional Development Framework, and Evaluation Strategies.* Sponsored and hosted by Region One Education Service Center, Edinburg, Tex., October 16, 1996.

Hall-Ellis, Sylvia D. *Texas Library Connection: Building the Districtwide Bibliographic Database.* Sponsored and hosted by Mercedes Independent School District, Mercedes, Tex., September 13, 1996 and August 8, 1996. Sponsored and hosted by Los Fresnos Consolidated Independent School District, Los Fresnos, Tex., August 12, 1996.

Hall-Ellis, Sylvia D. *School-to-Work and Special Education: An Inclusive Partnership for Success.* Sponsored and hosted by the Office of Special Education, Region One Education Service Center, Edinburg, Tex., September 11, 1996.

Hall-Ellis, Sylvia D. *Telecommunications Infrastructure Fund Board: An Overview of Funding for Secondary Schools.* Sponsored and hosted by Region One Education Service Center, Edinburg, Tex., August 31, 1996.

Hall-Ellis, Sylvia D. *Cataloging Books, Multimedia, and Realia in USMARC.* Sponsored and hosted by Edinburg Consolidated Independent School District, Edinburg, Tex., August 6, 1996.

Hall-Ellis, Sylvia D. *Internet Resources for Grant Writers.* Sponsored and hosted by Region One Education Service Center, Edinburg, Tex., April 20, 1996.

Hall-Ellis, Sylvia D. *Enhanced Grant Writing Skills for Mathematics Educators: Writing Skills for Campus Teams.* Sponsored and hosted by the Office of General Education, Region One Education Service Center, Edinburg, Tex., March 22, 1996.

Hall-Ellis, Sylvia D. *Internet Resources for Grant Writers.* Sponsored and hosted by the College of Education and Applied Science, Sam Houston State University, Huntsville, Tex., March 9, 1996.

Hall-Ellis, Sylvia D. *Grant Writing for Mathematics Educators: A Development Process for Campus Teams.* Sponsored and hosted by the Office of General Education, Region One Education Service Center, Edinburg, Tex., March 4, 1996.

Hall-Ellis, Sylvia D. *Shaking the Money Tree: Preparing Successful Technology Grant Applications.* Sponsored and hosted by the Office of Technology and Media Services, Region One Education Service Center, Edinburg, Tex., February 29, 1996 and April 29, 1996.

Hall-Ellis, Sylvia D. *District-wide Technology Planning: Technical Assistance for the Texas Education Agency Initiative.* Sponsored and hosted by the Office of Technology and Media, Region One Education Service Center, Edinburg, Tex., February 2, 1996.

Hall-Ellis, Sylvia D. *Enhanced Grant Writing Skills.* Sponsored and hosted by Pharr-San Juan-Alamo Independent School District, Pharr, Tex., January 27, 1996.

Hall-Ellis, Sylvia D. *United States Copyright Act of 1976, Video Transmissions, Computer Software and the Internet.* Sponsored and hosted by the Office of Technology and Media, Region One Education Service Center, Edinburg, Tex., January 24, 1996.

Hall-Ellis, Sylvia D. *The Grant Writing Development Process.* Sponsored and hosted by Pharr-San Juan-Alamo Independent School District, Pharr, Tex., January 20, 1996.

Hall-Ellis, Sylvia D. *MARC Cataloging of Materials for Library Media Centers.* Sponsored and hosted by the Office of Media Services, Region One Education Service Center for the Donna Independent School District, Donna, Tex., August 17, 1995.

Hall-Ellis, Sylvia D. *Classification.* Sponsored by AJ Seminars, Rockville, Maryland; presented at University Hilton Hotel, Houston, Tex., May 10, 1995.

Hall-Ellis, Sylvia D. *Library Technical Services.* Sponsored by AJ Seminars, Rockville, Maryland; presented at University Hilton Hotel, Houston, Tex., April 26, 1995.

Hall-Ellis, Sylvia D. *Grant Writing: An Introduction for Public School Administrators.* Sponsored and hosted by the Office of Administrative Services, Region One Education Service Center, Edinburg, Tex., April 19, 1995.

Hall-Ellis, Sylvia D. *The School Library Media Specialist in the 21st Century: Visions for the Future.* Sponsored and hosted by the United Independent School District, Laredo, Tex., March 31, 1995.

Hall-Ellis, Sylvia D. *Using USMARC.* Sponsored by AJ Seminars, Rockville, Maryland; presented at University Hilton Hotel, Houston, Tex., March 29, 1995.

Hall-Ellis, Sylvia D. *Library Media Center Policies and Guidelines: How to Prepare for School Board Adoption.* Sponsored and hosted by the Office of Technology and Media Services, La Joya Independent School District, La Joya, Tex., March 10, 1995.

Hall-Ellis, Sylvia D. *Developing District-wide Policies and Guidelines for Library Media Centers.* Sponsored and hosted by the Office of Technology and Media Services, La Joya Independent School District, La Joya, Tex., January 10, 1995.

Hall-Ellis, Sylvia D. *MARC Cataloging of Audiovisual Materials for Library Media Centers.* Sponsored and hosted by the Office of Library Media and Technology Services, Cypress-Fairbanks Independent School District, Houston, Tex., December 1, 1994.

Hall-Ellis, Sylvia D. *The School Library Media Specialist in the 21st Century: Visions for the Future.* Sponsored and hosted by United Independent School District, Laredo, Tex., October 14, 1994.

Hall-Ellis, Sylvia D. *The School Library Media Specialist in the 21st Century: Visions for the Future.* Sponsored and hosted by the Laredo Independent School District, Laredo, Tex., October 7, 1994.

Hall-Ellis, Sylvia D. *MARC Cataloging for Library Media Centers.* Sponsored by the Office of Library Media and Technology Services, Cypress-Fairbanks Independent School District, Houston, Tex., October 5, 1994.

Hall-Ellis, Sylvia D. *Jump to the Head of the Class: Undergraduate Library Resources Available at Sam Houston State University.* Sponsored by the Office of the Associate Vice President for Student Services, Sam Houston State University, Huntsville, Tex., October 4, 1994.

Hall-Ellis, Sylvia D. *CD-ROMs - 1994's Newest and the Best for Secondary Level Media Centers.* Sponsored and hosted by Clear Lake Independent School District, Houston, Tex., June 3, 1994.

Hall-Ellis, Sylvia D. *Introduction to Classification.* Sponsored by AJ Seminars, Rockville, Maryland; presented at Holiday Inn, Market Center, Dallas, Tex., May 18, 1994.

Hall-Ellis, Sylvia D. *Basic Descriptive Cataloging.* Sponsored by AJ Seminars, Rockville, Maryland; presented at University Hilton Hotel, Houston, Tex., May 4, 1994.

Hall-Ellis, Sylvia D. *Shaking the Money Tree - Part II: Writing Successful Grant Applications.* Sponsored by Donna Independent School District, Donna, Texas, and Region One Education Service Center Edinburg, Texas; presented at South Texas Community College Library, McAllen, Tex., April 29, 1994.

Hall-Ellis, Sylvia D. *Using MARC.* Sponsored by AJ Seminars, Rockville, Maryland; presented at Holiday Inn, Market Center, Dallas, Tex., April 6, 1994.

Hall-Ellis, Sylvia D. *Automated Authority Control.* Sponsored by AJ Seminars, Rockville, Maryland; presented at University Hilton Hotel, Houston, Tex., March 23, 1994.

Hall-Ellis, Sylvia D. *Automating the District School Library Media Centers: Choices and Opportunities.* Sponsored and hosted by the Office of Technology and Library Media Services, Fort Bend Independent School District, Sugar Land, Tex., March 4, 1994.

Hall-Ellis, Sylvia D. *Shaking the Money Tree - Part I: Preparing Successful Grant Applications.* Sponsored and hosted by the Office of Library Media Services, Donna Independent School District, Donna, Tex., February 4, 1994.

GRADUATE COURSES TAUGHT

San José State University, School of Library and Information Science
INFO 249 – Advanced Cataloging and Classification (Fall 2015, 2016; Summer 2016)
INFO 287 – Special Topics in Cataloging and Classification (Spring 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024; Fall 2020, 2021, 2022, 2023, 2024)
LIBR 248 – Beginning Cataloging and Classification (Summer 2002, 2003, 2004, 2005, 2006)
LIBR 249 – Advanced Cataloging and Classification (Summer 2003; Fall 2014; Summer 2015)

University of Denver, University College
Grant Writing Certificate Seminar for Non-Profit Organizations (Fall 2020, 2021; Spring 2021)

University of Denver, Morgridge College of Education HED
5991 – Grant Writing in Higher Education (Spring 2011)
LIS 4010 – Organization of Information (Fall 2002-2009; Winter 2005; Spring 2004-2006)
LIS 4020 – Professional Principles and Ethics (Summer 2000)
LIS 4040 – Management of Libraries and Information Centers (Fall 2010; Spring 2003, 2009 (DS); Winter 2005)
LIS 4070 – Cataloging and Classification (Winter 2008, 2009, 2010, 2011, 2012; Fall 2009 (DS)) LIS
4321 – Collection Management (Spring 2005)
LIS 4326 – LIS Research (Winter 2009 (DS); Spring 2009 (DS))
LIS 4350 – Adult Materials and Services (Summer 2006, 2009)
LIS 4379 – Social Sciences Resources (Spring 2009)
LIS 4400 – Cataloging and Classification (Spring 2000, 2001; Winter 2002-2009; Summer 2005, 2006 – course renumbered LIS 4070, September 2007)
LIS 4401 – Descriptive Cataloging (Winter 2001; Spring 2002, 2003, 2006-2009; Summer 2005)
LIS 4402 – Subject Cataloging (Spring 2001, 2009; Summer 2005, 2006, 2007, 2008)
LIS 4403 – Classification Schemes (Fall 2007, 2008, 2009 (DS)) LIS
LIS 4405 – Authority Control (Winter 2009)
LIS 4510 – Materials and Services for Children (Winter 2004; Summer 2005)
LIS 4620 – Grant Writing and Fundraising (Summer 2000, 2002, 2004, 2010; Winter 2006; Fall 2006-2009)
LIS 4700 – Seminar in Technical Services (Fall 2001)
LIS 4700 – Seminar in Public Libraries (Summer 2002)
LIS 4804 – Management of Electronic Records (Spring 2004; Fall 2005)
LIS 4902 – Capstone Projects (Winter 2003, Spring 2008, 2009, 2011)
LIS 4910 – Independent Study (every quarter Winter 2000 through Spring 2011)
LIS 4920 – Service Learning (every quarter Summer 2004 through Spring 2011)
RMS 4954 – Grant Writing (Summer 2013, 2014)
RMS 4959 – Content Analysis Methodology (Spring 2015)
QRM 4978 – Grant Writing (Summer 2011, 2012)

Rutgers University, School of Communication and Information
SC&I 522 – Cataloging and Classification (Summer 2013)

University of Arizona, College of Behavioral and Social Sciences
LIS 602 – Cataloging and Classification (Summer 1995)
LIS 612 – Advanced Online Search and Retrieval (Summer 1995)

Sam Houston State University, College of Education & Applied Science
LIS 532 - Cataloging and Classification (Fall 1993, 1994, 1995)
LIS 563 - Advanced Cataloging and Classification (Summer 1994)
LIS 567 - Research Methods (Spring 1994, Spring 1995)
LIS 591 - Educational Technology (Spring 1994, 1995)
LIS 596 - Networking and Computer Technologies in Education (Fall 1993, Summer 1994, Fall 1995)

Dissertations at the University of Denver

Bowers, Stacey L. *Library Anxiety of Law School Students: A Study Utilizing the Multidimensional Library Anxiety Scale.* Chair, May 5, 2010.

Fattor, Melissa M. *Student Engagement Differences by Ethnicity and Scale for Ninth Grade Students.* Chair, November 1, 2010.

Fulton, Roseanne. *A Case Study of Culturally Responsive Teaching in Middle School Mathematics.* Kent Seidel, Chair, June 18, 2009, Outside Chair.

Grealy, Deborah S. *Tribes and Territories in Library and Information Studies Education.* Bruce Uhrmacher, Chair, June 10, 2008, Committee Member.

McCord, J. Michael. *Developing a Standard of Care for Educational Malpractice.* Chair, April 15, 2011.

Priebe, Sarah J. *Distinguishing Effects of Domain and General Knowledge on Passage Fluency and Comprehension.* Jan Keenan, Chair. July 21, 2011, Outside Chair.

Snyder-Mondragon, Sandra M. *Institutional Factors that Impact the Retention of Graduate Students of Color in Schools of Library and Information Science: A Metaregression of Accredited Library School Statistics on Student Retention and Graduation Rates.* Kathy Green, Chair, July 24, 2009, Committee Member.

Taylor, Karen Pickles. *Effective Teaching.* Elinor Katz, Chair, July 15, 2009, Outside Chair.

Thompson, Jennifer. *Distinguishing a Western Women's College: A History of the Curriculum and Student Experience at Colorado Women's College.* Edith W. King, Chair, July 16, 2010, Committee Member.

Walker, Emelda. *Influence of Organizational Factors on Job Satisfaction of Disability Service Providers at Postsecondary Institutions.* Chair, April 29, 2010.

Dissertation Proposals at the University of Denver

Bowers, Stacey L. *Library Anxiety of Law School Students: A Study Utilizing the Multidimensional Library Anxiety Scale.* Chair, November 5, 2009.

McCord, J. Michael. *Developing a Standard of Care for Educational Malpractice.* Edith W. King, Chair. April 23, 2010.

Thompson, Jennifer. *History of Colorado Women's College.* Edith W. King, Chair, October 30, 2008. Committee Member.

Walker, Emelda. *Influence of Organizational Factors on Job Satisfaction of Disability Service Providers at Postsecondary Institutions.* Chair, July 21, 2009.

Dissertations at Other Institutions

Rodríguez-Mori, Howard. *The Information Behavior of Puerto Rican Immigrants to Central Florida, 2003-2009: Grounded Analysis of Six Case Studies Use of Social Networks during the Migration Process.* Kathleen Burnett, Chair, April 10, 2009, Florida State University, Committee Member.

Schwartz, Brian *More than a Look-up Skill: Medical Information Literacy Education in Osteopathic Medical Schools.* D. Mirah Dow, Chair, July 18, 2017. Emporia State University, Committee Member.

Snow, Karen. *A Study of the Perception of Cataloging Quality among Catalogers.* Shawne D. Miksa, Chair, August 1, 2011. University of North Texas, Committee Member.

Dissertation Proposals at Other Institutions

Schwartz, Brian *More than a Look-up Skill: Medical Information Literacy Education in Osteopathic Medical Schools.* D. Mirah Dow, Chair, December 4, 2015. Emporia State University, Committee Member.

Snow, Karen. *A Study of the Perception of Cataloging Quality among Catalogers.* Shawne D. Miksa, Chair, May 11, 2010. University of North Texas, Committee Member.

Master's Thesis at the University of Denver

Hemingson, Jeff. *Recital Paper.* Lamont School of Music, February 2010, Outside Chair.

Capstones at the University of Denver

Anthony, Alisa. *Correlation of Library and Information Science Program outcomes and Vacant Position Qualifications Listed on the Colorado State Library Jobline by Employers During the Period September 1, 2000 through August 31, 2002.* Chair, Winter Quarter, 2003.

Borden, Donna M. *Improving Emergency Communications Systems: Is a Radio Communications Network the Answer?* Fall Quarter, 2014.

Bowden, Heather L.M. *Exploring Biological Models for Long-term Data Preservation.* Chair, Spring Quarter, 2008.

Casenada, Cassandra Y. *Challenges to the Recruitment, Education, and Retention of Librarians of Color*. Chair, Spring Quarter, 2008.

Chang, Jennifer C. *Legal Research Practice and Preference: A Law Firm Perspective.* Chair, Spring Quarter 2011.

Ellis, Megan S. Fitzgerald. *Design of a Public Library Adult Volunteer Recruitment Program and Training Curriculum.* Chair, Winter Quarter, 2003.

Kircher, Kathy. *Development of a Library Pathfinder for Exobiology and Posting it on the Internet.* Chair, Winter Quarter, 2003.

Melhado, Loretta. *Design of St. John's Episcopal Church Library.* Chair, Spring Quarter, 2008.

Radcliff, Kathy. *Original Cataloging of Archival materials in the HERS Collection in Penrose Library.* Chair, Winter Quarter, 2003.

Sass, Carol Ann. *ACT Periodical Index: Access to Catholic Thinking Periodical Index: Web Index to Select Catholic Periodicals.* Spring Quarter 2000.

Stone, Sergio D. *Conducting Community Analysis for the Bemis Public Library (Littleton, Colorado) Using 2002 U.S. Census Data and the Online Outcome-Based Evaluation Toolkit.* Chair, Winter Quarter, 2003.

Tureson, Tamara. *Design and Use of an Information Audit Tool for Use in a Law Library.* Chair, Winter Quarter, 2003.

Tweed, Beth. *Evaluation of Email Reference Service in a Consumer Health Library Environment.* Chair, Winter Quarter, 2003.

GRANTS AND CONTRACTS

Student Learning in Agriculture STEM through Teacher Professional Development. Research team: Stanton Gartin (PI) and Cyndi Hofmeister, Northeast Junior College; Jeff Cash, Cheryl Sánchez, Anne-Marie Crampton, Lamar Community College; Suzanna Spears, Morgan Community College; Jack Wiley, Kerry Gabrielson, Trinidad State Junior College; Michael J. Miller, Colorado State University; Michael Womochil (Co-PI), Casey Sacks, and Sylvia D. Hall-Ellis, Colorado Community College System. U.S. Department of Agriculture, Agriculture and Food Research Initiative, Food, Agriculture, Natural Resources and Human Sciences Education and Literacy Initiative, $404,460 (2017-2020)

Leading and Achieving: the Colorado Agriculture Regional Consortium. Research team: Jack Wiley (PI), Kerry Gabrielson, Trinidad State Junior College; Jeff Cash (PI), Cheryl Sánchez, Anne-Marie Crampton, Lamar Community College; Suzanna Spears, Morgan Community College; Cyndi Hofmeister, Northeast Junior College; Michael Womochil (Co-PI), Casey Sacks, and Sylvia D. Hall-Ellis, Colorado Community College System. U.S. Department of Agriculture, Hispanic Serving Institutions Education Grants Program, $504,414 (2017-2020)

Cyber Prep Program Planning Grant. Research team: Debbie Sagen (PI), Brenda Lauer, Pikes Peak Community College; Gretchen Martin, Koiosa Insights; and, Sylvia D. Hall-Ellis, Colorado Community College System. U.S. Department of Commerce, Regional Alliances and Multi-stakeholder Partnerships to Stimulate (RAMPS) Cybersecurity Education and Workforce Development, $199,681 (2016-2018)

Career and Technical Education in Colorado: Pathways to Education and Employment. Research team: Heather McKay (PI), Rutgers University; Sarah Heath, Casey Sacks, Sylvia D. Hall-Ellis, Colorado Community College System. U.S. Department of Education, Institute of Education Sciences, $1,400,000 (2017-2021)

Pre-Alliance Planning Grant Colorado Community College Alliance. Research team: Victor Vialpondo (PI) and Janel Highfill, Community College of Aurora; Heidi Loshbaugh (Co-PI), Community College of Denver; Rick Reeves, Bill McGreevy, Liz Cox, and Kristin Aslin, Red Rocks Community College; Cathy Pellish, Front Range Community College; Samuel DeVries, Arapahoe Community College; Sylvia D. Hall-Ellis, Colorado Community College System. National Science Foundation, Louis Stokes Alliance for Minority Participation (LSAMP), $86,817 (2016-2017)

Towards Scalable Differentiated Instruction Using Technology-enabled, Competency-based, Dynamic Scaffolding. Research team: Karen Wilcox (PI) and Vijay Kumar, Center for Computational Engineering, Massachusetts Institute of Technology; Flora McMartin, Broad-based Knowledge; Quinsigamond Community College; and, Casey Sacks, and Sylvia D. Hall-Ellis, Colorado Community College System. U.S. Department of Education, First in the World Developmental Grant, $2,891,882 (2015-2019)

Colorado Strategic Partnerships Emergency Grant. Research team: Elise Lowe-Vaughn (PI), Amy Hodson, Celia Hardin, Barbara McBride, James Newby, Christopher Dewhurst, Nina Holland, Kate Anderson, MaryAnn Roe, Chrystalynn Chrystalynn, Elaine Edon, Mona Barnes, Tom Morgan, Rob Hanni, and Marie Valenzuela, Colorado Department of Labor and Employment; Steve Anton, Joelle Brouner, and, Katie Griego, Colorado Department of Human Services; Rebecca Holmes, Judith Martinez, and Jennifer Jirous, Colorado Department of Education; Emily Templin Lesh, Colorado Workforce Development Council; Cory Everett, Colorado Department of Regulatory Agencies; and, Casey Sacks and Sylvia D. Hall-Ellis, Colorado Community College System. U.S. Department of Labor, Strategic Partnerships Emergency Grant, $5,000,000 (2015-2017)

CAEL Jump Start Program: Competency-Based Education. Research team: Jerry Migler (PI), Casey Sacks, Debra Cohn, Thomas Hartman, and Sylvia D. Hall-Ellis, Colorado Community College System; Matt Jamison, Front Range Community College; Mike Coste, Red Rocks Community College; Amanda Corum, Pueblo Community College; Janet Colvin, Pikes Peak Community College; and, MaryAnn Matheny, Community College of Denver. Council for Adult and Experiential Learning, $15,000 (2015)

Summit on the Redesign of Developmental Education. Research team: Jerry Migler (PI), Casey Sacks, and Sylvia D. Hall-Ellis, Colorado Community College System; Chip Nava, Pueblo Community College; Kim Moultney, Arapahoe Community College; Debbie Ulibarri, Trinidad State Junior College; and, Kris Bernard, Front Range Community College. American Association of Community Colleges, $15,000 (2015-2016)

Equity in Excellence at Colorado Community Colleges. Research team: Keith Howard (PI) and Sylvia D. Hall-Ellis, Colorado Community College System; Estela Mata Bensimon, Center for Urban Education, University of Southern California; and Kerry Gabrielson, Trinidad State Junior College. Colorado Department of Higher Education, Colorado Opportunity Scholarship Program, $150,000 (2015-2016)

MBA High School of Business in Colorado. Research team: Laurie Urich (PI) and Sylvia D. Hall-Ellis, Colorado Community College System; Rudolph Sumpter and Beatrice Gerrish, Boulder Valley Schools; Keith Curry Lance, RSL Research Group. Colorado Department of Higher Education, Colorado Opportunity Scholarship Program, $501,295 (2015-2016)

Fullbridge Program in Colorado. Research team: Keith Howard (PI) and Sylvia D. Hall-Ellis, Colorado Community College System; Suzanna Spears, Fort Morgan Community College; and, Cheryl Sánchez and Anne-Marie Compton, Lamar Community College. Colorado Department of Higher Education, Colorado Opportunity Scholarship Program, $300,000 (2015-2017)

Colorado Community College System Alternative Credit Program. Research team: Jerry Migler (PI), Keith Howard, and Sylvia D. Hall-Ellis, Colorado Community College System. American Council on Education, $13,000 (2015)

Internationalization in Higher Education. Researcher: Samuel D. Museus. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Office of Internationalization, $8,000 (2014-2015)

International Perspectives on Bilingual Education. Researcher: Sharolyn Pollard-Durodola. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Office of Internationalization, $3,700 (2014-2015)

Cultivating Culturally Relevant and Responsive Curriculum and Pedagogy in College. Researcher: Samuel Museus. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, iRise Grant, $5,000 (2014-2015)

Project EMERGE (Educational Model for Evaluation and Replicability in Gifted Environments). Research team: Norma Hafenstein (PI) and Bruce Uhrmacher. Technical reviewer for MCE: Sylvia D. Hall-Ellis. Lynde and Harry Bradley Foundation, $235,000 (2014-2015)

Collecting Asian American Refugee Stories. Researcher: Samuel Museus. Technical reviewer for MCE: Sylvia D. Hall-Ellis. American Educational Research Association, Research Grant, $5,000 (2014-2015)

Developing Expertise in Teaching K-5 Mathematics. Research team: Julie Sarama (PI) and Douglas H. Clements (Co-PI), in partnership with the School of Education at the University of Michigan. Technical reviewer for MCE: Sylvia D. Hall-Ellis. National Science Foundation, $130,344 (2013-2015)

Investigation of the Long-Term Outcomes for Special Education Students. Researcher: Antonio Olmos-Gallos. Technical reviewer for MCE: Sylvia D. Hall-Ellis. Jefferson County School District, Office of Assessment, $40,000 (2014)

Refugee Community Collaboration. Researcher: Vicki Tomlin (PI) in partnership with the African Community Center and Jewish Family Service. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Center for Community Engagement and Service Learning, $14,854 (2014-2015)

Access to Mathematics for All. Research team: Richard S. Kitchen (PI), Nicole M. Russell (Co-PI), and Terrence Blackman (Co-PI), Curriculum Studies and Teaching Program, Morgridge College of Education; Álvaro Árias (Co-PI, Department of Mathematics); and, James Gray (Co-PI), Department of Mathematics, Community College of Aurora. Technical reviewer for MCE: Sylvia D. Hall-Ellis. National Science Foundation, The Robert Noyce Scholarship Program, Capacity Building Project, $349,926 (2014-2016)

Cognitive Test Battery for Intellectual Disabilities. Research team: Karen Riley (PI), Lyndsay Agans, Jessica Lerner, and Karin Dittrick-Nathan in partnership with David Hessl (PI), The MIND Institute at the University of California – Davis, and Elizabeth Berry-Kravis, Rush University Medical Center. Technical reviewer for MCE: Sylvia D. Hall-Ellis. National Institutes of Health, Outcome Measures for Use in Treatment Trials for Individuals with Intellectual and Developmental Disabilities (R01), $2,499,996 ($588,672 at DU) (2014- 2019)

Broadening Participation in Engineering among Women and Latino/as: A Longitudinal, Multi-Site Study. Researcher: Patton Garriott (PI) in partnership with the University of North Dakota and the University of Missouri. Technical reviewer for MCE: Sylvia D. Hall-Ellis. National Science Foundation, HER Core Research, $677,390 ($69,992 at DU) (2014-2019)

Designing a Teacher Evaluation System to Improve Teacher Effectiveness for Culturally and Linguistically Diverse Learners. Research team: María del Carmen Sálazar (PI), Jessica Lerner, and Kathy Green. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Professional Research Opportunities for Faculty, $29,988 (2014-2016)

Developing a College-Going Culture in Latina/O Families: Exploring the Influence of Funds of Knowledge on Family Outreach Programs. Researcher: Judy Marquez Kiyama. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Professional Research Opportunities for Faculty, $18,720 (2014-2016)

Assessment of Quality of Life in Neutral Implantation Surgery for the Treatment of Parkinson's Disease. Researcher: Cynthia McRae. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Office of Internationalization, $3,967 (2014-2015)

Pura Vida: Cloud Forest, Curriculum and Cross-Cultural Study. Research team: Norma Hafenstein (PI) and Bruce Uhrmacher (Co-PI). Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Office of Internationalization, $8,000 (2014-2015)

Online Course Development for Curriculum and Instruction. Researcher: Ruth Chao. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Office of Teaching and Learning, $3,000 (2014)

Online Course Development for Curriculum and Instruction. Researcher: María del Carmen Sálazar. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Office of Teaching and Learning, $3,000 (2014)

Online Course Development for Curriculum and Instruction. Researcher: Jessica Lerner. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Office of Teaching and Learning, $3,000 (2014)

Online Course Development for Curriculum and Instruction. Researcher: Duan Zhang. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Office of Teaching and Learning, $3,000 (2014)

The Mathematics Education of African Americans, 1866 – 1954. Researcher: Nicole M. Russell. Technical reviewer for MCE: Sylvia D. Hall-Ellis. National Academy of Education, Spencer Foundation Postdoctoral Fellowship, $55,000 (2014-2016)

Early Childhood Care and Education Study. Research team: Carrie Germeroth (PI), Melissa Mincic, and Douglas H. Clements. Technical reviewer for MCE: Sylvia D. Hall-Ellis. State of North Dakota, Department of Public Instruction, $73,500 (2013-2014)

Graduate Level Specialty in Addiction Counselor Training with Emphasis on Integration of Native American Specific Content. Research team: Ruth Chao (PI) and Michael J. Faragher (Co-PI). Technical reviewer for MCE: Sylvia D. Hall-Ellis. The Galena Foundation, $289,732 (2013-2016)

The Collecting Asian American and Pacific Islander Refugee Stories (CARS) Project. Researcher: Samuel Museus. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Center for Community Engagement and Service Learning, $15,000 (2014)

Parents in Transition: A Multiple Case Study of Parent and Family Orientation Programs. Researcher: Judy Marquéz Kiyama. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Faculty Research Fund, $1,500 (2014-2015)

The Sistah Network: Black Women Graduate Students Supporting and Retaining Each Other. Researcher; Nicole M. Russell. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Faculty Research Fund, $2,708 (2014-2015)

Evaluation of the Northeast Denver Babies Ready for College Program. Research team: Carrie Germeroth (PI), Melissa Mincic, and Douglas H. Clements. Technical reviewer for MCE: Sylvia D. Hall-Ellis. Mile High Montessori, $9,922 (2013-2014)

Developing Teaching Expertise in K-5 Mathematics. Research team: Julie Sarama (PI) and Douglas Clements (University of Denver), in partnership with Timothy Boerst (PI), Meghan Shaughnessy, Deborah Ball, Hyman Bass (School of Education at the University of Michigan). Technical reviewer for MCE: Sylvia D. Hall-Ellis. National Science Foundation, $449,827 ($130,344 at the University of Denver (2013-2015)

Early Learning Care and Education Study Program Grant for the State of North Dakota. Research team: Carrie Germeroth (PI), Melissa Mincic, and Sheridan Green. Technical reviewer for MCE: Sylvia D. Hall-Ellis. State of North Dakota Department of Public Instruction, $73,500 (2013-2014)

Local Professional Learning Community for School Leaders. Research team: Susan Korach (PI), Kristina Hesbol, and Rebecca McClure. Technical reviewer for MCE: Sylvia D. Hall-Ellis. Education Development Center, $10,950 (2013)

Healthy Eaters, Lifelong Movers 2: Implementing Evidence-Based School Environment, Policy, and Curricular Changes to Increase Opportunities for Healthy Eating and Physical Activity in Low Income, Rural Colorado. Research team: Elaine Berlansky, University of Colorado at Denver (PI), Nicholas Cutforth, University of Denver (Co-PI), and Allison Reeds. Technical reviewer for MCE: Sylvia D. Hall-Ellis. Colorado Health Foundation, $3,103,108 (2013-2017)

Hughes Rare Books Library Room Renovation in the Sturm College of Law. Project team: Patti H. Marks, Sylvia D. Hall-Ellis, and Leigh Elliott. Mabel T. Hughes Charitable Trust, $34,000 (2013-2014)

The Promise Center Partnership with the Marsico Institute for Early Learning and Literacy and the City and County of Denver. Research team: Karen Riley (PI), Douglas H. Clements (Co-PI), and Sheridan Green. Technical reviewer for MCE: Sylvia D. Hall-Ellis. The Piton Foundation, $223,468 (2013-2014)

Center of Excellence for Problem Gambling. Research team: Ruth Chao (PI) and J. Mike Faragher. Technical reviewer for MCE: Sylvia D. Hall-Ellis. Colorado Department of Behavioral Health, $68,021 (2012-2013)

United Way Implementation and Validation Review. Research team: Douglas H. Clements (PI), Amanda Moreno, and Sheridan Green. Technical reviewer for MCE: Sylvia D. Hall-Ellis. Mile High United Way, $19,737 (2013)

Math/Science Partnership in Rural Districts. Research team: Kristen Bunn (PI, Eagle County Schools), Paul Michalec (Co-PI), and Alegra Reiber. Technical reviewer for MCE: Sylvia D. Hall-Ellis. Colorado Department of Education, Colorado's Mathematics and Science Partnership Program, $750,000 (2013-2014)

Mathematics and Science Education of African Americans. Research team: Nicole Russell (PI), Sylvia D. Hall-Ellis, Steve Fisher (Penrose Library). Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Professional Research Opportunities for Faculty, $29,994 (2013-2015)

Online Course Development for Curriculum and Instruction. Researcher: Nicole Russell. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Office of Teaching and Learning, $3,000 (2013)

Discourse and Opportunity: Undocumented Students and Higher Education Policy. Researcher: Ryan Gildersleeve. Technical reviewer for MCE: Sylvia D. Hall-Ellis. National Academy of Education, Spencer Foundation Postdoctoral Fellowship, $55,000 (2012-2014)

An Anthropological Study of the Latino Graduation Ceremony. Researcher: Ryan Gildersleeve. Technical reviewer for MCE: Sylvia D. Hall-Ellis. Spencer Foundation, $39,900 (2012-2013)

Fragile-X and Pharmaceutical Company: Clinical Trial of AFQ056. University of California – Davis Children's Hospital MIND Institute (Sacramento), Children's Hospital Denver, and Rush Children's Hospital at Rush University Medical Center (Chicago). Karen Riley, PI. Technical reviewer for MCE: Sylvia D. Hall-Ellis. Novartis Pharmaceuticals Corporation, $394,206 (2012-2014)

Project Engage, Phase 2, a DAPRA Grant in partnership with Total Immersion Systems, Inc., and Texas A&M University. Research team: Karen Riley (PI) and Lyndsay Agans (Co-PI). Technical reviewer for MCE: Sylvia D. Hall-Ellis. U.S. Department of Defense, $60,000 (2011-2013)

International School Psychology Practicum Exchange. Researcher: Gloria L. Miller. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Center for Community Engagement and Service Learning, $14,951 (2012-2013)

Online Course Development for Curriculum and Instruction. Research team: Bruce Uhrmacher (PI) and Norma Hafenstein (Co-PI). Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Office of Teaching and Learning, $18,193 (2012-2014)

Writers in the Schools. Research team: Karen Riley (PI) and Amanda Moreno (Co-PI).Technical reviewer for MCE: Sylvia D. Hall-Ellis. Colorado Humanities, $4,965 (2012-2013)

Learning Ecosystem Validation Grant. Research team: Karen Riley (PI), Lyndsay Agans, Kent Seidel, and Shimelis Assefa. Technical reviewer for MCE: Sylvia D. Hall-Ellis. Bill & Melinda Gates Foundation, $315,000 (2012-2013)

Project Words of Oral Reading and Language Development (WORLD). Research team: Jorge E. Gonzalez (PI), Texas A&M University; Laura Saenz (Co-PI), University of Texas – Pan American; and, Sharolyn Pollard-Durodola (Co-PI), University of Denver. Technical reviewer for MCE: Sylvia D. Hall-Ellis. U.S. Department of Education, Institute of Education Sciences, $53,354 (2012-2015); award $640,718, transfer from Texas A&M University

Increasing the Efficacy of an Early Mathematics Curriculum with Scaffolding Designed to Promote Self-Regulation. Research team: Douglas H. Clements (PI) and Julie Sarama (Co-PI). Technical reviewer for MCE: Sylvia D. Hall-Ellis. U.S. Department of Education, Institute of Education Sciences, $1,445,315 (2008-2014); award $4,541,975, transfer from University at Buffalo, The State University of New York

Using Rule Space and Poset-based Adaptive Testing Methodologies to Identify Ability Patterns in Early Mathematics and Create a Comprehensive Mathematics Ability Test. Research team: Douglas H. Clements (PI) and Julie Sarama (Co-PI). Technical reviewer for MCE: Sylvia D. Hall-Ellis. National Science Foundation, $323,791 (2010-2014); award $1,194,944, transfer from University at Buffalo, The State University of New York

Comprehensive Postdoctoral Training in Scientific Education Research. Researcher: Julie Sarama (PI). Technical reviewer for MCE: Sylvia D. Hall-Ellis. U.S. Department of Education, Institute of Education Sciences, $133,458 (2010-2014); award $613,353, transfer from University at Buffalo, The State University of New York

Longitudinal Study of a Successful Scaling Up Project: Extending TRIAD. Research team: Douglas H. Clements (PI), Julie Sarama (Co-PI), and Abt Associates (Carolyn Layzer, Fatih Unlu, Laurie Bozzi, Lily Fesler, Alina Martinez, Cristofer Price, James van Orden). Technical reviewer for MCE: Sylvia D. Hall-Ellis. Institute of Education Sciences, $384,940 (2011-2015; award $1,250,286, transfer from University at Buffalo, The State University of New York

Early Childhood Education in the Context of Mathematics, Science, and Literacy. Research team: Julie Sarama (PI), Douglas H. Clements (Co-PI). Technical reviewer for MCE: Sylvia D. Hall-Ellis. National Science Foundation, $990,020 (2010-2014; award $2,285,228, transfer from University at Buffalo, The State University of New York

Early Childhood Clearinghouse Information Center Redesign. Research team: Karen Riley (PI) and Amanda Moreno (Co-PI).Technical reviewer for MCE: Sylvia D. Hall-Ellis. Office of the Lt. Governor of Colorado, $12,000 (2012-2013)

Morgridge Rural Educational Leadership Initiative. Research team: Lyndsay Agans (PI), Linda Brookhart (Co-PI), Susan Korach, and Rebecca McClure. Technical reviewer for MCE: Sylvia D. Hall-Ellis. Morgridge Family Foundation, $100,000 (2012-2014)

Center of Excellence for Problem Gambling. Research team: Patrick Sherry (PI) and J. Mike Faragher. Technical reviewer for MCE: Sylvia D. Hall-Ellis. Colorado Department of Behavioral Health, $55,000 (2012-2013)

Intermodal Transportation Institute Research Initiatives. Researcher: Patrick Sherry. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University Transportation Centers Program, Research and Innovative Technology Administration, U.S. Department of Transportation. $600,000 (2012-2014)

Mile High United Way Social Innovation Fund Early Literacy Initiative. Gloria L. Miller, PI, Amanda Moreano, Kim Hartnett-Edwards, and Sheridan Green. Technical reviewer for MCE: Sylvia D. Hall-Ellis. Mile High United Way, $89,992 (2012-2013)

International School Psychology Practicum Exchange. Researcher: Gloria L. Miller. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Center for Community Engagement and Service Learning, $1,000 (2012-2013)

Refugee Student Art Outreach. Researcher: Karin Dittrick-Nathan. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Faculty Research Fund, $3,000 (2012-2013)

Resistance, Resilience, and Reciprocity: Centering the Voices of Black Doctoral Women with Faculty Aspirations. Researcher: Nicole M. Russell. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Faculty Research Fund, $2,965 (2012-2013)

Assessing Learning through Student Notebooks. Research team: Keith Miller, Nancy Sasaki, and Kathy Green. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Professional Research Opportunities for Faculty, $30,000 (2012-2014)

International School Psychology Practicum Exchange. Researcher: Gloria L. Miller. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Office of Internationalization, $2,000 (2012-2013)

ELO in Colorado. Research team: Cynthia Hazel and Duan Zhang. Technical reviewer for MCE: Sylvia D. Hall-Ellis. Colorado Legacy Foundation, $150,000 (2012-2013)

Creating Online LIS Courses. Research team: Mary C. Stansbury (PI), Shimelis Assefa, Denise Anthony, Xiao Hu, and Krystyna Matusiak. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Center for Teaching and Learning, $15,000 (2011-2013)

Maritime Piracy Seminar. Researcher: Ved Nanda, The Nanda Center, Sturm College of Law. Technical reviewer for Sturm College of Law: Sylvia D. Hall-Ellis. Arsenault Family Foundation, $15,000 (2012-2013).

Early Childhood Librarianship: An Interdisciplinary, Experiential Learning MLIS. Researcher: Mary C. Stansbury (PI). Technical reviewer for MCE: Sylvia D. Hall-Ellis. Laura Bush's 21st Century Librarians Program, Institute for Museums and Library Services, $249,066 (2012-2014)

Learning Ecosystem Planning Grant. Research team: Karen Riley (PI), Lyndsay Agans, Kent Seidel, and Shimelis Assefa. Technical reviewer for MCE: Sylvia D. Hall-Ellis. Bill & Melinda Gates Foundation, $281,217 (2011-2012)

Advanced Service Learning Practitioner Faculty Grant, Sylvia D. Hall-Ellis, University of Denver, Center for Community Engagement and Service Learning, $400 (2011)

Evaluating and Enhancing the EspeciallyMe Program. Research team: Lori D. Patton and Nicole Russell. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Center for Community Engagement and Service Learning, Public Good Fellowship Grant, $24,780 (2012)

Choosing Excellence: Let Every Child Bloom. Research team: Shimelis Assefa (PI) and Mary C. Stansbury (Co-PI). Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Center for Community Engagement and Service Learning, Public Good Grant, $7,657 (2012)

K-8 STEM Content Specific Professional Development to Improve Elementary Student Achievement. Research team: Kent Seidel (PI), Nicole Russell (Co-PI), Kimberly Hartnett-Edwards, Paul Michalec, Jeff Farmer, Keith Miller, Alegra Reiber, and Nancy Sasaki. Technical reviewer for MCE: Sylvia D. Hall-Ellis. Colorado Department of Education, Improving Teacher Quality Grant, (Title II ESEA), $307,299 (2011-2012)

Building a Better Principal Pipeline to Boost Student Achievement. Researcher: Susan Korach. Technical reviewer for MCE: Sylvia D. Hall-Ellis. Denver Public Schools; a subcontract from the Wallace Foundation Grant, $170,000 (2011-2017)

Center of Excellence for Problem Gambling. Research team: J. Mike Faragher (Co-PI) and Bobbie Vollmer (PI). Technical reviewer for MCE: Sylvia D. Hall-Ellis. Colorado Department of Behavioral Health, $79,999 (2011-2012)

An Exploration of Novice Teachers' Core Competencies: Impacts on Student Achievement, and Effectiveness of Preparation. Research team: Kent Seidel (PI), Kathy Green (Co-PI), Kimberly Hartnett-Edwards, and Duan Zhang. Technical reviewer for MCE: Sylvia D. Hall-Ellis. Institute of Education Sciences, Effective Teachers and Effective Teaching, $990,987 (2012-2015)

Project Engage, a DAPRA Grant in partnership with Total Immersion Systems, Inc., and Texas A&M University. Research team: Karen Riley (PI) and Lyndsay Agans (Co-PI). Technical reviewer for MCE: Sylvia D. Hall-Ellis. U.S. Department of Defense, $49,964 (2011-2014)

User-centered Evaluation of Music Search Engines. Researcher: Xiao Hu. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Faculty Research Fund, $2,931 (2011-2012)

Educational Practicum in Vietnam and China to Promote the Inclusion of Young Children with Disabilities. Researcher: Gloria L. Miller. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Office of Internationalization, $5,000 (2011-2012)

Evaluation of Colorado's Enhancing Quality in Infant-Toddler (EQIT) Initiative. Research team: Virginia R. Maloney and Amanda Moreno. Technical reviewer for MCE: Sylvia D. Hall-Ellis. Buell Foundation, $395,884 (2011-2013)

Creating Engaging Environments to Teach Pre-Algebra Mathematics to Elementary Students. Research team: Álvaro Arias, Mario López, María del Carmen Salazar, and Lyndsay Agans. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver Interdisciplinary Grant, $60,000 (2011-2012)

Morgridge Education Technology Accessible (META) Resource Project. Research team: Lyndsay Agans (PI) and Shimelis Assefa (Co-PI). Technical reviewer for MCE: Sylvia D. Hall-Ellis. Morgridge Family Foundation, $36,000 (2011)

MCE Connect: A 21st Century Framework for Faculty Development. Research team: Bruce Uhrmacher (PI), Shimelis Assefa (Co-PI), Lyndsay Agans (Co-PI), Kimberly Hartnett-Edwards, Norma Hafenstein, Xiao Hu, Paul Michalec (Co-PI), María del Carmen Salazar (Co-PI), and Sandra Snyder-Mondragon. Technical reviewer for MCE: Sylvia D. Hall-Ellis. University of Denver, Center for Teaching and Learning, $22,355 (2011-2012)

Parent Education and Parent Leadership and Advocacy. Research team: Virginia Maloney (PI) and Amanda Moreno, Marsico Institute for Early Learning and Literacy. Technical reviewer for MCE: Sylvia D. Hall-Ellis. Colorado Health Foundation, $27,358 (2010-2011)

Intentional School Culture. Researcher: Cynthia Hazel. Technical reviewer for MCE: Sylvia D. Hall-Ellis. Denver Public Schools, $38,040 (2010-2011)

Healthy Eaters, Lifelong Movers: Implementing Evidence-Based School Environment, Policy, and Curricular Changes to Increase Opportunities for Healthy Eating and Physical Activity in Low Income, Rural Colorado. Research team: Elaine Berlansky, University of Colorado at Denver (PI), Nicholas Cutforth, University of Denver (Co-PI), and Allison Reeds. Technical reviewer for MCE: Sylvia D. Hall-Ellis. Colorado Health Foundation, $1,683,277 (2011-2014)

Second Life Learning Community. Research team: Don McCubbrey (PI), Sylvia D. Hall-Ellis (Co-PI), Walter LaMendola, and Paul Novak. University of Denver, Center for Teaching and Learning, $13,000 (2010-2011)

Reintroducing the Value of Law Librarians to Academic and Public Librarians in Colorado through the Identification and Use of Emerging Technologies. Research team: Sylvia D. Hall-Ellis (Co-PI), Stacey L. Bowers (PI), and Christopher Hudson, in partnership with Denver Public Library, Arapahoe Library District, and the Colorado State Supreme Court Library. University of Denver, Center for Community Engagement and Service Learning, $5,773 (2010-11)

Reintroducing the Value of Law Librarians to Public Librarians through the Identification and Use of Emerging Technologies and Resources. Research team: Stacey Bowers (PI) and Sylvia D. Hall-Ellis (Co-PI). American Association of Libraries, Wolters Kluwer Law & Business Grant Program, $2,725 (2010-2011)

Faculty Service Learning Pod. Research team: María del Carmen Salazar and Nicholas Cutforth (Curriculum and Instruction Program), Frank Tuitt (Higher Education Program), Cynthia Hazel and Gloria Miller (Child, Family, and School Psychology Program), and Sylvia D. Hall-Ellis (Library and Information Science Program). University of Denver, Center for Community Engagement and Service Learning, $8,000 (2010-2011)

Lincoln Collaborative. Research team: Antonio Esquibel (Principal, Lincoln High School), María del Carmen Salazar (Curriculum and Instruction Program), and. Sylvia D. Hall-Ellis. School Improvement Grant, Denver Public Schools, $375,000 (2010-2012)

Future LEADers of America: Leaders III. Research team: Denver Public Library (Kristen Svendson, PI), the University of Denver (Sylvia D. Hall-Ellis), the Colorado Chapter of REFORMA (Orlando Archibeque), and the Colorado Association of Libraries (Martin Garnar). Laura Bush's Recruiting Librarians for the 21st Century Program, Institute for Museums and Library Services, $988,366 (2009-2012)

Teaching for Success in the Library Environment: LIS 4030 in Library 2.0. Research team: Deborah S. Grealy (PI) and Sylvia D. Hall-Ellis (Co-PI). University of Denver, Center for Teaching and Learning, $ 9,350 (2009-10)

Writing Group Faculty Grant, Sylvia D. Hall-Ellis, University of Denver, Center for Community Engagement and Service Learning, $750 (2008-2009)

Collaborative Learning Faculty Grant, Sylvia D. Hall-Ellis, University of Denver, Center for Teaching and Learning, $1,500 (2008)

Connecting Information Literacy to Learning. Research team: Lori Micho, Merrie Valliant, Amanda Samland, and Sylvia D. Hall-Ellis. Colorado State Library, LSTA Discretionary Grant Program, $19,548 (2008-2009)

Law Librarianship Fellows Program. Research team: Sylvia D. Hall-Ellis (PI), Stacey Bowers (Co-PI), and Christopher Hudson, Westminster Law Library. Laura Bush's 21st Century Librarians Program, Institute for Museums and Library Services, $999,370 (2008-2012)

Grant Writing in a Cooperative Learning Environment. Sylvia D. Hall-Ellis. University of Denver, Center for Teaching and Learning, $2,000 (2008-2009)

Project Homeless Connect 6 Event Evaluation. Research team: Sylvia D. Hall-Ellis and Duan Zhang. University of Denver Center for Community Engagement and Service Learning, $9,785 (2008)

Project Ecuador: International Learning Service Libraries – A Faculty Development Experience in Ecuador. Sylvia D. Hall-Ellis, Office of Internationalization, University of Denver, $600 (2007)

Project Ecuador: International Learning Service Libraries – A Faculty Development Experience in Ecuador. Sylvia D. Hall-Ellis, International Service Learning Office, University of Denver, $400 (2007)

Project Homeless Connect 5 Event Evaluation. Research team: Sylvia D. Hall-Ellis and Duan Zhang. University of Denver Center for Community Engagement and Service Learning, $1,000 (2007)

Project Homeless Connect 4 Event Evaluation. Research team: Sylvia D. Hall-Ellis and Duan Zhang. University of Denver Center for Community Engagement and Service Learning, $4,595 (2007)

Future LEADers of America: Leaders II. Research team: Denver Public Library (Kristen Svendson, PI), the University of Denver (Sylvia D. Hall-Ellis), and the Colorado Chapter of REFORMA (Orlando Archibeque). Laura Bush's Recruiting Librarians for the 21st Century Program, Institute for Museums and Library Services, $988,518 (2007-2010)

Strategic Planning Assistance for the Denver Medical Library. Sylvia D. Hall-Ellis. Denver Medical Library, Inc., $30,000 (2006-2007)

Destiny Software for JMAC Student Lab. Sylvia D. Hall-Ellis, gift from the Sagebrush Corporation, Minneapolis, Minnesota, $10,000 (2006)

Libraries: Tools for Education and Development Worldwide: A Faculty Development Experience in France. Sylvia D. Hall-Ellis, Office of Internationalization, University of Denver, $800 (2005)

Denver Public Library: Opportunities for Change. Sylvia D. Hall-Ellis, Colorado Community Based Research Network, $2,000 (2005)

Future LEADers of America. Research team: Denver Public Library (Letty Icolari and Steve Taylor, PIs), Emporia State University (Jim Agee), and the University of Denver (Sylvia D. Hall-Ellis). Recruiting Librarians for the 21st Century Program, Institute for Museums and Library Services, $670,315 (2005-2008)

American Association of University Professors Summer Institute Professional Development Grant. Sylvia D. Hall-Ellis, American Association of University Professors, $300 (2005)

Beta Phi Mu Alumni Tea. Sylvia D. Hall-Ellis, gift from the Office of Alumni and Parent and Relations, University of Denver, $2,000 (2005)

Spectrum Software for LIS Student Lab. Sylvia D. Hall-Ellis, gift from the Sagebrush Corporation, Minneapolis, Minnesota, $5,000 (2005)

Developing Research Capacity in Community Organizations and Residents through Training and Technical Assistance. Nicholas J. Cutforth (PI) and Sylvia D. Hall-Ellis. Piton Foundation, $25,000 (2005-2006)

Libraries: Tools for Education and Development Worldwide: A Faculty Development Experience in Argentina. Sylvia D. Hall-Ellis, Office of Internationalization, University of Denver, $500 (2004)

Developing Research Capacity in Community Organizations and Residents through Training and Technical Assistance. Research team: Nicholas J. Cutforth (PI), Gary Lichtenstein and Sylvia D. Hall-Ellis, Piton Foundation, $25,000 (2003-2004)

Increasing Spanish-Speaking and Hispanic Diversity among Library and Information Science Students at the University of Denver: Development of a Student Recruitment Model. Researcher: Sylvia D. Hall-Ellis (PI), Office of Multicultural Excellence, University of Denver, $2,750 (2003-2004)

Collection Development Enrichment to Support the Cataloging & Classification Specialization and School Librarianship within the Library & Information Science Program at the University of Denver. Research team: Sylvia D. Hall-Ellis (PI) and Deborah S. Grealy. Women's Library Association, University of Denver, $4,000 (2003)

Collection Development Enrichment to Support the Library & Information Science Program at the University of Denver. Research team: Deborah S. Grealy (PI) and Sylvia D. Hall-Ellis. Women's Library Association, University of Denver, $4,000 (2001)

Wireless LAN for Library Education. Research team: Deborah S. Grealy (PI) and Sylvia Hall-Ellis. University of Denver, Center for Teaching and Learning, $24,000 (2001-2002)

Upward Bound – A Program for South Texas Youth. Research team: Monte Churchill, Executive Director of Community Relations; Gary R. Sauceda, Outreach Coordinator; Raymond Hernandez, (PI) Associate Dean for Student Success; and Sylvia D. Hall-Ellis, South Texas Community College (McAllen, Texas). U.S. Department of Education, Office of Postsecondary Education, $2,672,003 (1999-2003)

Write Now! Improving Elementary Students' Writing Skills. Research team: Caryl G. Thomason, Assistant Superintendent (PI); Karen Tankersley, Principal; and, Hal Anderson, Director of Technology, Cheyenne Mountain School District 12 (Colorado Springs, Colorado); and Sylvia D. Hall-Ellis. Colorado Department of Education, Educational Telecommunications Unit, $189,453 (1999-2001)

Operation Quick Start -- Distance Learning in Rural Colorado. Research team: Randal Weigum, Technology Coordinator (PI); Bonnie Barns, Director of Federal Programs and Staff Development; and, Adam "Joe" Raskop, Executive Director, Southeastern Board of Cooperative Educational Services (Lamar, Colorado); and Sylvia D. Hall-Ellis. Colorado Department of Education, Educational Telecommunications Unit, $400,000 (1999-2001)

Advanced Technological Training for Information Professionals for the 21st Century. Research team: Mario Reyna, Division of Business Director (PI) and Sylvia D. Hall-Ellis, South Texas Community College (McAllen, Texas). Phi Delta Kappa and the National Science Foundation, $250,000 (1999-2001)

Working Connections – Training Information Technologies Professionals for the 21st Century. Research team: Mario Reyna, Division of Business Director (PI) and Sylvia D. Hall-Ellis, South Texas Community College (McAllen, Texas). Microsoft Corporation and the American Association of Community Colleges, $1,147,775(1999-2001)

The ROAD (Research Oriented Amplification of Development to Literacy) Program. Research team: Deborah J. Leong (PI), Metropolitan State University; Elena Bodrova, Metropolitan State University; Dmitri Semenov, Robert J. Marzano, and Sylvia D. Hall-Ellis, Mid-continent Regional Educational Laboratory (Aurora, Colorado). Hewlett-Packard Foundation, $25,000 (1998-1999)

Press to Literacy. Research team: Deborah J. Leong (PI), Metropolitan State University; Elena Bodrova, Metropolitan State University; Dmitri Semenov, Robert J. Marzano, and Sylvia D. Hall-Ellis, Mid-continent Regional Educational Laboratory (Aurora, Colorado). The Denver Post and the Robert S. McCormick Foundation, $49,818 (1998-1999)

International Telementor Center. Research team: David Neils, David B. Frost (PI), and Sylvia D. Hall-Ellis, Mid-continent Regional Educational Laboratory (Aurora, Colorado). Hewlett-Packard Philanthropy, $100,000 (1998-1999)

America Reads: Providing Tutor Training for the America Reads Challenge. Research team: Louis F. Cicchinelli (PI) and Sylvia D. Hall-Ellis, Mid-continent Regional Educational Laboratory (Aurora, Colorado). U.S. Department of Education, Office of Educational Research and Improvement, $306,000 (1998-1999)

Comprehensive School Reform. Research team: Louis F. Cicchinelli (PI), J. Timothy Waters, and Sylvia D. Hall-Ellis, Mid-continent Regional Educational Laboratory (Aurora, Colorado). U.S. Department of Education, Office of Educational Research and Improvement, $285,000 (1998-1999)

Sustainable Energy Education (SEE) Program for Grades 4-8: Preparing Today's Youth for Lifelong Learning and Responsible Actions in Energy Conservation. Research team: Mary Gromko, Colorado Department of Education; Gene McCarthy, Rocky Flats Field Office, U.S. Department of Energy; Gina Kissell, National Renewable Energy Laboratory; and Barbara L. McCombs (PI), Janet L. Bishop, and Sylvia D. Hall-Ellis, Mid-continent Regional Educational Laboratory (Aurora, Colorado). State of Colorado Governor's Office for Energy Conservation, $499,936 (1997-1999)

Review of Kansas Curriculum Standards in Mathematics and Language Arts. Research team: Robert J. Marzano (PI), John S. Kendall, David B. Frost, and Sylvia D. Hall-Ellis, Mid-continent Regional Educational Laboratory (Aurora, Colorado). Submitted to the Kansas State Department of Education, $25,903 (1998)

International Telementor Center. Research team: David Neils, John Kuglin, Chris Rapp, David B. Frost (PI), and Sylvia D. Hall-Ellis, Mid-continent Regional Educational Laboratory (Aurora, Colorado). Hewlett-Packard Company, $54,752 (1998)

Genesis Mission: Education Public Outreach. Developed in partnership by the Jet Propulsion Laboratory, California Institute of Technology, Los Alamos National Laboratory, Lockheed Martin Astronautics, and the Mid-continent Regional Educational Laboratory (Aurora, Colorado). Research team: John T. Sutton (PI), Alice Krueger, Martha Henry, Greg Rawls, Shae Isaacs, Jeff Johnson, Deb Jordan, Arlene Mitchell, David B. Frost, Jana Caldwell, J. Timothy Waters, and Sylvia D. Hall-Ellis. National Aeronautics and Space Administration, $139,700,000; subcontract award, $4,750,000 (1997-2007)

North Dakota Mathematics Assessment Project. Developed in partnership by the North Dakota Department of Education and Mid-continent Regional Educational Laboratory (Mid-continent Regional Educational Laboratory). Research team: Ann Clapper, Clarence Bina, Greg Gallagher, North Dakota Department of Education; Don Burger (PI), Hillary Michaels, and Sylvia D. Hall-Ellis, Mid-continent Regional Educational Laboratory (Aurora, Colorado). U.S. Office of Education, $1,618,214; subcontract award, $389,076 (1997-2001)

Pacific Resources for Education and Learning Distance Education: Project Evaluation. Developed in partnership by the Pacific Educational Community, the Pacific Resources for Education and Learning (PREL), and Mid-continent Regional Educational Laboratory (McREL). Research team: John W. Kofel (PI), Executive Director, PREL; J. Timothy Waters, Executive Director; Joan Buttram, Robert Keller, and Sylvia D. Hall-Ellis, Mid-continent Regional Educational Laboratory (Aurora, Colorado). U.S. Office of Education, Star Schools Program, $10,000,000; subcontract award, $500,000 (1997-2002)

Identification of Bilingual Gifted and Talented Children: A Comprehensive School Grants for Bilingual Education. Developed in partnership by Hidalgo (Texas) ISD, Los Fresnos (Texas) CISD, Progreso (Texas) ISD, University of Texas – Pan American (Edinburg, Texas), and Education Service Center, Region One (Edinburg, Texas). Research team: Hilda Medrano, Dean, College of Education, University of Texas – Pan American; Linda Phemister (PI), Janie Navarro, and Sylvia D. Hall-Ellis, Education Service Center, Region One. U.S. Department of Education, Office of Bilingual Education and Minority Languages Affairs, $1,670,633 (1997-2002)

Academics 2000: First Things First -- The Texas Goals 2000. Developed for Jim Hogg (Hebbronville, Texas) County ISD, Mirando City (Texas) ISD, and San Isidro (Texas) ISD. Research team: Hilda Medrano, Dean, College of Education, University of Texas - Pan American (Edinburg, Texas); Angie Lehmann, Amy Mares, Ellen Gonzalez (PI), and Sylvia D. Hall-Ellis, Education Service Center, Region One (Edinburg, Texas). Texas Education Agency, $339,987 (1997-2000)

Southwestern Bell's Learning Communities Initiative. Developed for Tech Prep of the Rio Grande Valley, Inc. (Harlingen, Texas); the Center for Professional Teacher Development, University of Texas – Brownsville; Teach for America – Rio Grande Valley (McAllen, Texas); and Education Service Center, Region One (Edinburg, Texas). Research team: Patricia G. Bubb, Executive Director (PI), Tech Prep of the Rio Grande Valley; Martin Winchester, Executive Director, Teach for America – Rio Grande Valley; Aileen Johnson, Director, School of Education, University of Texas – Brownsville; and Sylvia D. Hall-Ellis. Southwestern Bell Foundation, $100,000 (1997-1998)

Texas School to Work: Regional Implementation. Developed for Tech Prep of the Rio Grande Valley, Inc. (Harlingen), South Texas Community College (McAllen), Texas State Technical College (Harlingen), Texas Southmost College (Brownsville), Empowerment Zone of the Rio Grande Valley (Mercedes), Project VIDA (Weslaco), Youth Fair Chance (McAllen), and Education Service Center, Region One (Edinburg). Research team: Patricia G. Bubb (PI), Tech Prep of the Rio Grande Valley; Stephen Vassberg, Texas State Technical College; Ellen Trevino, Youth Fair Chance; Wanda Garza, Project VIDA; Leonardo Olivares, University of Texas – Pan American; Michael Bell, South Texas Community College; and Sylvia D. Hall-Ellis. Texas Workforce Commission, $4,250,000 (1997-2002).

Comprehensive Bilingual Education Grant for Hidalgo ISD and Roma ISD. Developed for Hidalgo (Texas) ISD, Roma (Texas) ISD, College of Education, University of Texas – Pan American (Edinburg, Texas), and Education Service Center, Region One (Edinburg, Texas). Research team: Tomas Thomas (PI), Director, Office of Bilingual Education and Sylvia D. Hall-Ellis. U.S. Department of Education, Office of Bilingual Education and Minority Languages Affairs, $1,531,361 (1997-2002)

Lopez High School, Porter High School, Rivera High School, Central Middle School, and Perkins Middle School, Brownsville (Texas) Independent School District. Telecommunications Infrastructure Fund Board, $1,473,611 (1997-1998)

Donna High School, Todd Middle School, and Solis Middle School, Donna (Texas) Independent School District. Telecommunications Infrastructure Fund Board, $704,052 (1997-1998)

Memorial Middle School and Nellie Schunior Middle School, La Joya Independent School District (Texas). Telecommunications Infrastructure Fund Board, $293,641 (1997-1998)

Martin High School, Christen Middle School, Cigarroa Middle School, Lamar Middle School, Laredo (Texas) Independent School District. Telecommunications Infrastructure Fund Board, $1,200,000 (1997-1998).

Lasara Middle School, Lasara (Texas) Independent School District. Telecommunications Infrastructure Fund Board, $246,210 (1997-1998)

Los Fresnos High School and Resaca Middle School, Los Fresnos (Texas) Consolidated Independent School District. Telecommunications Infrastructure Fund Board, $500,000 (1997-1998)

Lyford Junior High School, Lyford (Texas) Independent School District. Telecommunications Infrastructure Fund Board, $354,997 (1997-1998)

Travis Middle School, McAllen (Texas) Independent School District. Telecommunications Infrastructure Fund Board, $269,139 (1997-1998)

Mission High School, Mission (Texas) Independent School District. Telecommunications Infrastructure Fund Board, $297,010 (1997-1998)

Progreso High School, Progreso (Texas) Independent School District. Telecommunications Infrastructure Fund Board, $300,000 (1997-1998)

San Perlita High School, San Perlita (Texas) Independent School District. Telecommunications Infrastructure Fund Board, $293,490 (1997-1998)

Myra Green Junior High School, Raymondville (Texas) Independent School District. Telecommunications Infrastructure Fund Board, $225,000 (1997-1998)

Rio Grande City High School, Ringgold Middle School, Gruella Middle School, Rio Grande City (Texas) Independent School District. Telecommunications Infrastructure Fund Board, $809,934 (1997-1998)

Rio Hondo Junior High School, Rio Hondo (Texas) Independent School District. Telecommunications Infrastructure Fund Board, $297,024 (1997-1998)

Roma High School, Roma (Texas) Independent School District. Telecommunications Infrastructure Fund Board, $333,178 (1997-1998)

San Benito High School, Miller Jordan Junior High School, San Benito (Texas) Consolidated Independent School District. Telecommunications Infrastructure Fund Board, $547,000 (1997-1998)

Santa Maria High School and Santa Maria Middle School, Santa Maria (Texas) Independent School District. Telecommunications Infrastructure Fund Board, $400,000 (1997-1998)

Salvador High School, United Independent School District (Laredo, Texas). Telecommunications Infrastructure Fund Board, $250,879 (1997-1998)

Weslaco High School, Cabaza Middle School, Cuellar Middle School, Weslaco (Texas) Independent School District. Telecommunications Infrastructure Fund Board, $874,242 (1997-1998)

Principals' Assessment and Training Center. Developed for Education Service Center, Region One (Edinburg, Texas). Research team: Roberto Zamora, Leonel Barrera, William H. Parry, and Sylvia D. Hall-Ellis. Texas Principals' Leadership Initiative, Texas Association of Secondary School Principals, Texas Association of Elementary School Principals, and the Sid Richardson Foundation. $461,439 (1996-1998)

The Texas Library Connection -- Integrating and Sharing Resources. Developed for Hidalgo County Library System (McAllen), Cameron County Library System (Brownsville), South Texas Community College (McAllen), the University of Texas - Pan American (Edinburg), University of Texas – Brownsville, and Education Service Center, Region One (Edinburg). Research team: William R. McGee, Coordinator, Hidalgo County Library System; Joe Garcia, Director, Cameron County Library System; Michael D. Bell, Library Director, South Texas Community College; Eleanor Folger Foster, University Library, University of Texas - Pan American; Jaime Vela (PI), Director of Instructional Technology and Media Services, Ron Pontius, Instructional Technology, and Fabiola Fuentes, Media Services, Education Service Center, Region One; and Sylvia D. Hall-Ellis. Office of Library Media Services, Technology Services, Texas Education Agency. $8,000 (1996-1997)

Developing Leadership Communities for Improving Algebra I for All Students. Developed for a partnership of the Region One Statewide Systemic Initiative Team. Research team: Noel Villarreal (PI), Eduardo Cancino, and Sylvia D. Hall-Ellis, Education Service Center, Region One (Edinburg). Texas Statewide Systemic Initiative for Reform in Mathematics, Science and Technology Education to The Charles A. Dana Center for Mathematics and Science Education, The University of Texas at Austin. $25,000 (1996-1997)

Academics 2000: First Things First -- The Texas Goals 2000. Developed for Edinburg (Texas) CISD. Research team: Hilda Medrano, Dean, College of Education, University of Texas - Pan American (Edinburg); Helen Jones, Director (PI), Gifted and Talented Education, Edinburg CISD; and Sylvia D. Hall-Ellis, Education Service Center, Region One (Edinburg). Texas Education Agency, $750,000 (1996-2001)

Texas Teachers Empowered for Achievement in Mathematics (TEXTEAM) Institute for Algebra I. Developed for Hidalgo ISD, Jim Hogg (Hebbronville) County ISD, La Joya ISD, La Villa ISD, Lyford ISD, Mission CISD, Pharr-San Juan-Alamo ISD, Rio Hondo ISD, San Isidro ISD, San Perlita ISD, Santa Maria ISD, Santa Rosa, Sharyland ISD, Valley View ISD, Webb (Laredo) CISD, Weslaco ISD, and Zapata County (Zapata) ISD. Research team: Noel Villarreal (PI), Chuck McInteer, Ellen M. Gonzalez, Education Service Center, Region One (Edinburg); and Sylvia D. Hall-Ellis. Charles A. Dana Center for Mathematics and Science Education, University of Texas - Austin, $15,975 (1996)

Community Learning Center for La Villa, Texas. Developed for Edcouch-Elsa Independent School District. Research team: Noe Gonzalez (PI), Assistant Superintendent, Edcouch-Elsa Independent School District, and Sylvia D. Hall-Ellis. Delta Region Subzone, Rio Grande Valley (Texas) Rural Empowerment Zone, $325,000 (1996-1997)

Monte Alto (Texas) Community Learning Center. Developed for Monte Alto Independent School District. Research team: Homero A. Diaz (PI), Superintendent, Monte Alto Independent School District, and Sylvia D. Hall-Ellis. Delta Region Subzone, Rio Grande Valley (Texas) Rural Empowerment Zone, $300,000 (1996-1997)

Community Learning Center for La Villa, Texas. Developed for La Villa Independent School District. Research team: Sam Gonzalez (PI), Assistant Superintendent, La Villa Independent School District; and Sylvia D. Hall-Ellis. Delta Region Subzone, Rio Grande Valley (Texas) Rural Empowerment Zone, $325,000 (1996-1997)

Building Project for Taylor Elementary. Developed for Mercedes (Texas) Independent School District. Research team: Mrs. Denise Rivera, Librarian, and Eduardo Infante, Principal, Taylor Elementary School; Ismael S. Cantu (PI), Federal Programs Director, Mercedes Independent School District; and Sylvia D. Hall-Ellis. Delta Region Subzone, Rio Grande Valley (Texas) Rural Empowerment Zone, $375,000 (1996-1997)

Border Education Network (BEN) - Distance Education through Cable Television. Developed for Edinburg (Texas) Consolidated Independent School District. Research team: Noe Torres (PI), Library Media Specialist, Magdalena Rosas, Library Media and Technology Coordinator, Edinburg Consolidated Independent School District; and Sylvia D. Hall-Ellis, Education Service Center, Region One (Edinburg). Edinburg (Texas) Consolidated School District, $250,000 (1996-1997)

Multiservice One-Stop Open Enrollment Charter School. Developed for the Information Referral Resource Assistance, Inc. (McAllen, Texas). Research team: Pablo Perez and Aguie Pena (PI), Executive Director, Information Referral Resource Assistance, Inc.; Roberto Zamora and Sylvia D. Hall-Ellis, Education Service Center, Region One (Edinburg). Texas Education Agency, $3,066,000 (1996-2001)

Project OK: A Community Youth Opportunities Grant for Summer, 1996. Developed for McAllen (Texas) Independent School District, St. Joseph the Worker Catholic Church, and the Office of Adult Education, Education Service Center, Region One. Research team: Father Bart Flatt, St. Joseph the Worker Catholic Church; Noe Calvillo (PI), Office of Adult Education; Maria Louisa Garcia, McAllen Independent School District; and Sylvia D. Hall-Ellis, Education Service Center, Region One (Edinburg). Texas Protective and Regulatory Agency through the Office of the Mayor, City of McAllen, $350,000 (1996-2001).

Early Childhood: a Time of Discovery. Developed for a partnership of Lasara ISD, Rio Hondo ISD, San Perlita ISD, the School of Education, University of Texas - Brownsville, and Education Service Center, Region One (Edinburg). Research team: Hugo Rodriguez, Dean, School of Education, University of Texas - Pan American; Leonel Barrera and Jack Damron, Field Service Agents, Ellen M. Gonzalez (PI), Administrator for Student Instructional Services, Ruth Solis, Education Specialist in Special Education, and Sylvia D. Hall-Ellis, Education Service Center, Region One (Edinburg). Texas Education Agency, $722,090 (1996-2001)

Innovative Gifted and Talented Programs for Early Childhood and Elementary Education Students. Developed for a partnership of Edinburg (Texas) CISD, the School of Education, University of Texas - Pan American (Edinburg), and Education Service Center, Region One (Edinburg). Research team: Hilda Medrano, Dean,

School of Education, University of Texas - Pan American; Helen de la Garza (PI), Director of Elementary Curriculum and Instruction, Edinburg CISD; and Sylvia D. Hall-Ellis. Texas Education Agency, $750,000 (1996-2001)

Reading Recovery in Early Elementary Grades. Developed for a partnership of La Villa (Texas) ISD the School of Education, University of Texas - Pan American (Edinburg), and Education Service Center, Region One (Edinburg). Research team: Hilda Medrano, Dean, School of Education, University of Texas - Pan American; Marcario Salinas (PI), Supervisor of Elementary Curriculum and Instruction, La Villa ISD; and Sylvia D. Hall-Ellis, Education Service Center, Region One. Texas Education Agency, $750,000 (1996-2001)

Connected Mathematics Project for Middle and Junior High Students. Developed for a partnership of Michigan State University, The Charles A. Dana Center for Mathematics and Science Education, The University of Texas at Austin and Region One Statewide Systemic Initiative Team. Research team: Jack Damron, Chuck McInteer, Noel Villarreal (PI), and Sylvia D. Hall-Ellis, Education Service Center, Region One (Edinburg). National Science Foundation through Michigan State University to the Charles A. Dana Center at the University of Texas - Austin, $539,610 (1996-1999)

Sharing Resources: Testing the Interlibrary Loan Potential of the Texas Library Connection -- Integrating Media Resources. Developed under the sponsorship of the Hidalgo County Library System (McAllen) and Education Service Center, Region One (Edinburg). Research team: William H. McGee, Hidalgo County System Coordinator; Fabiola Fuentes, Library Media; Ronald Pontius (PI), Instructional Technology, Education Service Center, Region One; and Sylvia D. Hall-Ellis. Library Media Services Program, Office of Technology Services, Texas Education Agency, $25,000 (1996-1997)

State and Federal Adult Education JOBS Program. Developed for Education Service Center, Region One (Edinburg). Research team: Noe Calvillo (PI), Director, Adult Education Program, and Sylvia D. Hall-Ellis. Adult Education Program, Texas Education Agency, $532,846 (1995-1996)

Creating Safe and Drug-Free Schools and Communities. Developed for a partnership of the Region One Consortium for Safe and Drug-Free Education Environments. Research team: Clara Contreras (PI), Health Specialist, and Sylvia D. Hall-Ellis, Education Service Center, Region One (Edinburg). Texas Education Agency, $150,000 (1995-1996)

Developing Leadership Communities for Improving Mathematics Performance for All Students on Title I Campuses. Developed for a partnership of the Region One Statewide Systemic Initiative Team. Research team: Jack Damron, Chuck McInteer, Noel Villarreal (PI), and Sylvia D. Hall-Ellis, Education Service Center, Region One (Edinburg). Texas Statewide Systemic Initiative for Reform in Mathematics, Science and Technology Education to The Charles A. Dana Center for Mathematics and Science Education, The University of Texas at Austin, $50,669 (1995-1996)

The Impact of Library Resource Centers on Academic Achievement in Selected Public Schools in South Texas. Sylvia D. Hall-Ellis (PI). Developed under the sponsorship of the Department of Library Science, College of Education and Applied Science, Sam Houston State University (Huntsville). Texas Association of School Librarians, Children's Services Round Table, and Young Adults Round Table (Austin, Texas), $2,500 (1995)

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ATTACHMENT 6

MULTIMEDIA SYSTEMS AND TECHNIQUES

edited by

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CONTENTS

PREFACE xi

1 MULTIMEDIA OBJECTS

Rei Hamakawa and Atsushi Atarashi 1

1 Introduction 1

2 A Class Hierarchy for Multimedia Objects 4

3 Composite Multimedia Object Model by Gibbs et al. 17

4 MHEG 21

5 Object Composition and Playback Models by Hamakawa et al. 26

6 Conclusion 36

REFERENCES 37

2 COMPRESSION TECHNIQUES AND STANDARDS

Borko Furht 43

1 Introduction to Multimedia Compression 43

2 JPEG Algorithm for Still Image Compression 49

3 PX64 Compression Algorithm for Video Communications 67

4 MPEG Compression for Motion-Intensive Applications 72

5 Conclusion 84

3 MULTIMEDIA INTERFACES: DESIGNING FOR DIVERSITY

Meera Blattner 87

1 Introduction 87

2 What is an Interface? 88

3 Designing Multimedia Interfaces 91

4 Applications and New Technologies 107
5 Conclusion 117
REFERENCES 118

4 MULTIMEDIA STORAGE SYSTEMS
Harrick M. Vin and P. Venkat Rangan 123
1 Introduction 123
2 Multimedia Storage Servers 125
3 Managing the Storage Space Requirement of Digital Multimedia 126
4 Efficient Retrieval of Multimedia Objects 132
5 Commercial Video Servers 140
6 Concluding Remarks 141
REFERENCES 142

5 MULTIMEDIA NETWORKS
Borko Furht and Hari Kalva 145
1 Introduction 145
2 Traditional Networks and Multimedia 149
3 Asynchronous Transfer Mode 156
4 Summary of Network Characteristics 165
5 Comparison of Switching Technologies for Multimedia Communications 166
6 Information Superhighways 167
7 Conclusion 171

6 MULTIMEDIA SYNCHRONIZATION
B. Prabhakaran 177
1 Introduction 177
2 Language Based Synchronization Model 181
3 Petri Nets Based Models 185
4 Fuzzy Synchronization Models 197
5 Content-based Inter-media Synchronization 200
6 Multimedia Synchronization and Database Aspects 204
7 Multimedia Synchronization and Object Retrieval Schedules 206
8 Multimedia Synchronization and Communication Requirements 209
9 Summary and Conclusion 213

REFERENCES 214

7 INFOSCOPES: MULTIMEDIA INFORMATION SYSTEMS

Ramesh Jain 217

1 Introduction 217
2 Information and Data 220
3 Operations in InfoScopes 225
4 InfoScope Architecture 228
5 Knowledge organization 234
6 Interfaces 237
7 Example Systems 239
8 Conclusion and Future Research 250

REFERENCES 251

8 SCHEDULING IN MULTIMEDIA SYSTEMS

A. L. Narasimha Reddy 255

1 Introduction 255
2 Data Organization 258
3 Disk Scheduling 259
4 Network Scheduling 275
5 General Discussion 289

REFERENCES 290

9 VIDEO INDEXING AND RETRIEVAL

Stephen W. Smoliar and HongJiang Zhang 293

1 Introduction 293
2 Parsing 296
3 Representation and Classification 307
4 Indexing and Retrieval 311
5 Interactive Tools 315
6 Conclusion 318

INDEX 323

6

MULTIMEDIA SYNCHRONIZATION

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1 INTRODUCTION

Multimedia information comprises of different media streams such as text, images, audio, and video. The presentation of multimedia information to the user involves spatial organization, temporal organization, delivery of the components composing the multimedia objects, and allowing the user to interact with the presentation sequence. The presentation of multimedia information can be either *live* or *orchestrated.* In live presentation, multimedia objects are acquired in real-time from devices such as video camera and microphone. In orchestrated presentation, the multimedia objects are typically acquired from stored databases. The presentation of objects in the various media streams have to be ordered in time. *Multimedia synchronization* refers to the task of coordinating this ordering of presentation of various objects in the time domain. In a live multimedia presentation, the ordering of objects in the time domain are implied and are dynamically formulated. In an orchestrated presentation, this ordering is explicitly formulated and stored along with the multimedia objects.

Synchronization can be applied to concurrent or sequential presentation of objects in the various media streams composing the multimedia presentation. Figure 1 shows an example of synchronization during sequential and concurrent presentation. Consider the concurrent presentation of audio and images shown in Figure 1. Presentation of the objects in the individual media streams, audio and image, is sequential. The points of synchronization of the presentation corresponds to the change of an image and the beginning of a new audio clipping. Multimedia presentation applications must ensure that these points of synchronization are preserved.

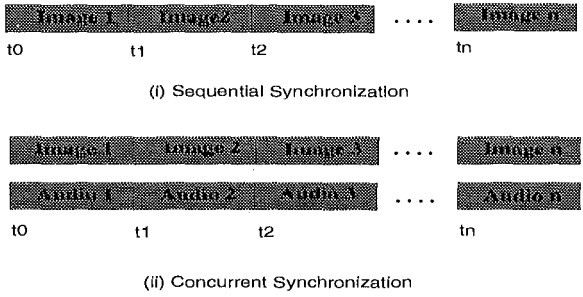


Figure 1 Synchronization in multimedia presentation.

The points of synchronization in a multimedia presentation can be modified by the user going through the presentation. In an orchestrated presentation, for example, a user may interact by giving inputs such as skip event(s), reverse presentation, navigate in time, scale the speed of presentation, scale the spatial requirements, handle spatial clash, freeze and restart of a presentation. User inputs such as skip, reverse presentation and navigate time modify the sequence of objects that are being presented. User inputs such as scaling the speed of presentation modify the presentation duration of the objects. User inputs such as handling spatial clash on the display screen make the corresponding media stream *active* or *passive* depending on whether the window is in the foreground or background. Similarly, while the freeze user input suspends the activities on all streams, restart input resumes the activities on all streams. In the presence of non-sequential storage of multimedia objects, data compression, data distribution, and random communication delays, supporting these user operations can be very difficult.

1.1 Modeling Temporal Relations

The points of synchronization in a multimedia presentation are described by the corresponding temporal information. Temporal information can be represented by *time points or time instants* and *time intervals.* Time instants are characterized by specifications such as *AT.9.00 AM* and time intervals by specifications such as *1 hour* or *9.00 AM to 5.00 PM.* Time interval is defined by two time instants : the start and the end. A time instant is a zero-length

moment in time whereas a time interval has a duration associated with it. A time interval can be defined as an ordered pair of instants with the first instant less than the second [5]. Time intervals can be formally defined as follows [13]. Let $[S, \leq]$ be a partially ordered set, and let a, b be any two elements of S such that $a \leq b$. The set $\{x | a \leq x \leq b\}$ is called an *interval* of S denoted by [a,b]. *Temporal relations* can then be defined based on the start and end time instants of the involved intervals. Given any two time intervals, there are thirteen ways in which they can relate in time [5], whether they overlap, meet, precede, etc. Figure 2 shows a timeline representation of the temporal relations. Six of the thirteen relations are inverse of the seven relations that are shown in Figure 2.

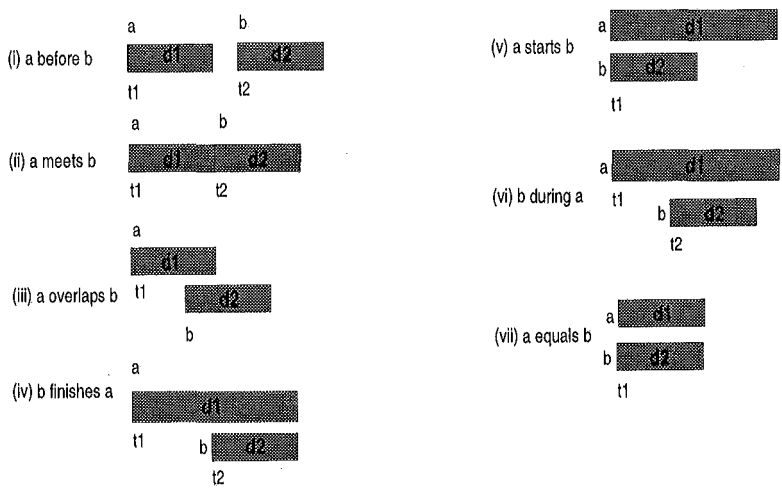


Figure 2 Temporal relations between two events.

Multimedia presentation can be modeled by temporal intervals with the time and duration of presentation of the multimedia objects being represented by individual time intervals. The time dependencies of the multimedia objects composing the presentation are brought out by their temporal relationships. In some cases, it may not be possible to formulate precise temporal relationships among the multimedia objects. However, *relative* temporal relationships can be specified among the objects to be presented. This mode of *fuzzy representation* or the relative temporal specification is to be contrasted with the *absolute* specification. As an example, the specification *present object A at time T* is an absolute temporal relation. Whereas *present object A with (or after) object B* is

a relative temporal specification. Consider a scenario where n objects are to be presented and the exact temporal requirements of the composing objects are not available. Using fuzzy temporal specification, one can formulate a relationship saying that all the $n-1$ objects are to be presented *during* the presentation of the object that has the longest duration.

1.2 Synchronization Specification Methodologies

Multimedia synchronization specification in terms of the temporal relationships can be absolute or relative. Even in the case of absolute temporal relations, the time deadlines are *soft*. For example, nothing untoward happens if the object is not available for presentation at the scheduled time instant. Methodologies used for synchronization specification should capture all the temporal interdependencies of the objects composing the multimedia presentation and at the same time should have the flexibility for indicating *soft* deadlines. A synchronization methodology should also allow the user to modify the sequence of presentation dynamically. The temporal relationships in orchestrated multimedia presentations have to be captured in the form of a database and a specification methodology must be suitable for developing such a database.

One approach to the specification of multimedia synchronization is to use parallel language paradigms that can be parsed during presentation to the user. Here, the presentation of individual media streams are assigned to executable processes and these processes synchronize via inherent language constructs. Language based schemes for multimedia synchronization have been proposed in [9, 11, 14]. Another approach is to use graphical models. Graphical models have the additional advantage of providing a visual representation of the synchronization specification. Graphical models for synchronization specification have been based on Petri nets [1] and Time-flow Graphs [19]. Another new approach to synchronization specification has been proposed in [21]. This proposal, called the *content-based synchronization*, is based on the semantic structure of the objects composing the multimedia presentation.

Outline of this Chapter : In this chapter, we discuss the various methodologies used for describing multimedia synchronization in an orchestrated multimedia presentation. In Section 2, we examine language based models for multimedia synchronization. In Sections 3 and 4, we discuss graphical models based on Petri nets and Time-flow Graphs. In Section 5, we study the content-based approach for synchronization specification. After discussing the

synchronization methodologies, we present the database storage aspects of multimedia synchronization in Section 6. We then consider distributed orchestrated multimedia presentations where objects have to be retrieved over a computer network before their delivery to the user. In Sections 7 and 8, we describe how a multimedia synchronization specification can be applied to derive schedules for object retrieval over computer networks and to derive the communication requirements of an orchestrated presentation.

2 LANGUAGE BASED SYNCHRONIZATION MODEL

Language based synchronization models view multimedia synchronization in the context of operating systems and concurrent programming languages. Based on an object model for a multimedia presentation, the synchronization characteristics of the presentation are described using concurrent programming languages. As discussed in [9], the basic synchronization characteristics of a multimedia presentation as viewed from the point of view of programming languages are :

- number of multimedia objects involved
- blocking behavior of individual multimedia objects while waiting for synchronization
- allowing more than two multimedia objects combine many synchronization events
- ordering of synchronization events
- coverage of real-time aspects

The above characteristics influence the basic features required from a concurrent programming language in order to describe a multimedia presentation. For example, the *number of involved objects* describes the communication among the multimedia objects that should be described by the language. *Blocking behavior of a multimedia object* describes the nature of synchronization mechanism that is required *viz.* blocked-mode, non-blocked mode and restricted blocked mode. The non-blocked mode would never force synchronization but allows objects to exchange messages at specified states of execution. Blocked

mode forces an object to wait till the cooperating object(s) reach the specified state(s). *Restricted blocked mode* is a concept introduced in [9]. In the context of multimedia presentation, restricted blocking allows an activity to be repeated by an object till the synchronization is achieved with the cooperating object(s). The activity can be presenting the last displayed image for an image object or playing out a pleasant music in the case of an audio object. Restricted blocking basically allows the multimedia presentation to be carried out in a more *user friendly* manner.

More than two objects may have to be allowed to combine many synchronizing events. This is especially true in presentations where many streams of information are presented concurrently. A programming language should be able to describe this scenario. The ordering of synchronization events become necessary when two or more synchronization events are combined by some kind of a relation. The ordering can be *pre-defined*, *prioritized* or *based on certain conditions*. As multimedia presentations deal with data streams conveying information to be passed in real-time, synchronization of the events composing the presentation incorporates real-time features.

2.1 Enhancements For Concurrent Programming Languages

Following the above discussions, additional features are necessary in a concurrent programming language for describing real-time features and for describing restricted blocking. In this section, we discuss these enhancements for a concurrent programming language suggested in [9].

Real-Time Synchronization Semantics : In a multimedia presentation, events have to be synchronized *at* specified times or *within* a time interval. As an example, video images and the corresponding audio have to be synchronized within 150 milliseconds. In [9], following terms of multimedia relations are introduced for a concurrent programming language.

- *Timemin* is the minimum acceptable delay between two synchronization events. The usual parameter is "0".
- *Timeave* is the ideal delay between synchronization events i.e., the synchronization should be as close to timeave as possible, though it might occur before or after timeave. The usual timeave parameter is also "0".

Expression	Meaning
timemin(....)	Minimum acceptable delay between two synchronizing events.
timeave(....)	Ideal delay.
timemax(....)	Maximum acceptable delay.
timemin(....) AND timemax(....)	Synchronization : between timemin and timemax.
timemin(....) AND timeave(....)	Synchronization : closer to timeave, never before timemin.
timemax(....) AND timeave(....)	Synchronization : closer to timeave, never after timemax.
timemin(....) AND timemax(....) AND timeave(....)	Synchronization : closer to timeave, between timemin and timemax.

Table 1 Semantics For Basic Real-Time Synchronization.

- *Timemax* is the *time-out* value and refers to the maximum acceptable delay between synchronization events. The parameter for timemax vary depending on the type of media objects involved in the synchronization.

The proposal in [9] also allows the above specified *temporal operands* to be combined. The operands *timemin* and *timemax* are not commutative, thereby allowing specification of a different delay depending on which multimedia object executes its synchronizing operation first. The temporal operands can be combined using logical operator AND. Table 1 describes the possible temporal expressions and their associated meaning.

Restricted Blocking Semantics : Figure 3 shows a possible multimedia presentation scenario with restricted blocking. Here, activity A presents a full motion video while the activity B presents the corresponding audio. Activity A, if it first waits for synchronization with activity B, keeps displaying the last presented image. In a similar manner, activity B, if it first waits for synchronization with activity A, plays out pleasant music. The proposal in [9] describes a *WHILE_WAITING* clause for specifying restricted blocking. The program segment in Table 2 shows the synchronization between the activities A and B (shown in Figure 3) with restricted blocking and real-time restrictions. The synchronization delay between the two objects should be between 1 second of the audio object ahead of the video object and 2 seconds of the video object

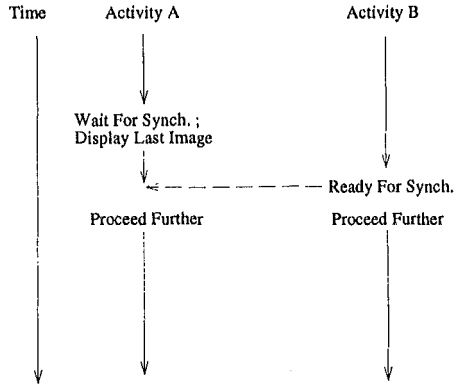


Figure 3 Restricted blocking in multimedia presentation.

program of Object_A :	program of Object_B :
– video	– audio
– from Source A	– from Source B
display (Object_A)	display (Object_B)
SYNCHRONIZE WITH	SYNCHRONIZE WITH
Object_B AT end	Object_A AT end
MODE restricted_blocking	MODE restricted_blocking
WHILE_WAITING	WHILE_WAITING
display(last_image)	play (music)
TIMEMIN 0	TIMEMIN 0
TIMEMAX 1s	TIMEMAX 2s
TIMEAVE 0	TIMEAVE 0
EXCEPTION display(last_image)	EXCEPTION play(music)

Table 2 Program With Restricted Blocking & Time Constraints

ahead of the image object. However, the target is no delay (with timemin being 0).

Summary : Language based specification of the multimedia synchronization characteristics uses concurrent programming language features. Enhancements

to the facilities offered by the programming languages are needed for describing certain features of multimedia presentation such as real-time specification and restricted blocking. However, language based specifications can become complex when a multimedia presentation involves multiple concurrent activities that synchronize at arbitrary time instants. Also, modifying the presentation characteristics might even involve rewriting the program based specification.

3 PETRI NETS BASED MODELS

Petri Nets, as a modeling tool, have the ability to describe real-time process requirements as well as interprocess timing relationships, as required for multimedia presentations [1, 2]. A Petri net is a bipartite graph consisting of 'place' nodes and 'transition' nodes. Places, represented by circles, are used to represent conditions; transitions, drawn as bars, are used to represent events. A *Petri net structure P* is a triple,

P = { T, P, A } where

T = $\{ t_1, t_2, \ldots \}$ represents a set of transitions (bars)

P = $\{ p_1, p_2, \ldots \}$ represents a set of places (circles)

A : { **T** * **P** } **U** { **P** * **T** } $\rightarrow$ **I**, **I** = { **1, 2,** ...} representing set of integers

The arcs represented by A describe the *pre-* and *post*-relations for places and transitions. The set of places that are incident on a transition t is termed the *input places* of the transition. The set of places that follow a transition t is termed the *output places* of the transition. A Marked Petri Net is one in which a set of 'tokens' are assigned to the places of the net. Tokens, represented by small dots inside the places, are used to define the execution of the Petri net, and their number and position change during execution. The marking (M) of a Petri net is a function from the set of places P to the set of nonnegative integers I, M : P $\rightarrow$ I. A marking is generally written as a vector $(m_1, m_2, ..., m_n)$ in which $m_i = M(p_i)$. Each integer in a marking indicates the number of tokens residing in the corresponding place (say p_i).

Execution of a Petri net implies *firing* of a transition. In a Marked Petri net, a transition t is enabled for firing iff each of its input place contain atleast one

token,i.e.,
$\forall(p \in InputPlace(t)) : M(p) \geq 1$.
Firing t consists of removing one token from each of its input place and adding one token to each of its output place, and this operation defines a new marking. An execution of a Petri net is described by a sequence of markings, beginning with an initial marking M_o and ending in some final marking M_f. Marking of a Petri net defines the *state* of the net. During the execution, Petri net moves from a marked state M_i to another state M_j by firing any transition t that are enabled in the state M_i.

For the purpose of modeling time-driven systems, the notion of time was introduced in Petri nets, calling them as Timed Petri Nets (TPN) [4]. In TPN models, the basic Petri net model is augmented by attaching an execution time variable to each node in the net. The node in the Petri net can be either the place or the transition. In a marked TPN, a set of tokens are assigned to places. A TPN N is defined as,

N = { T, P, A, D, M } where

M : P → I represents marking M which assigns tokens (dots) to each place in the net

D : P → R represents durations as a mapping from the set of places to the set of real numbers

other descriptions *T, P, A* are same as that of the *normal* Petri net.

A transition is enabled for execution iff each of its input place contain atleast one token. The firing of a transition causes a token to be held in a locked state for a specified time interval in the output place of the transition, if the time intervals are assigned to places. If time intervals are assigned to transitions, the token is in a transition state for the assigned duration. The execution of a Petri net process might have to be interrupted in order to carry out another higher priority activity. Pre-emption of the on-going execution of a Petri net process can be modeled using escape arcs to interrupt the execution of a process [6]. In this section, we examine Petri net based models for the purpose of describing the synchronization characteristics of the multimedia components.

3.1 Hypertext Models Using Timed Petri Nets

TPN concept has been used to specify the browsing semantics in the Trellis Hypertext System [7, 10]. This Petri net based Hypertext model allows browsing events to be initiated by the reader or by the document itself. A synchronous hypertext H is defined as a 7-tuple H = < N, M_o, C, W, B, P_l, P_d > in which

N is a timed Petri net structure

M_o is an initial state (or initial marking) for N

C is a set of document contents

W is a set of windows

B is a set of buttons

P_l is a logical projection for the document

P_d is a display projection for the document.

In the above definition, the structure of the timed Petri net specifies the structure of the hypertext document. A marking in the hypertext hence represents the possible paths through a hyperdocument from the browsing point it represents. The initial marking of a synchronous hypertext therefore describes a particular browsing pattern. The definition also includes several sets of components *(contents, windows,* and *buttons)* to be presented to the user going through the document. Two collections of mappings or *projections* are also defined: one from the Petri net to the user components and another from the user components to the display mechanism.

The content elements from the set C can be text, graphics, still image, motion video, audio information or *another hypertext.* A *button* is an action selected from the set B. A *window* is defined as a logically distinct locus of information and is selected from the set W. P_l, the logical projection, provides a mapping from the components of a Petri net (place and transitions) to the *human-consumable* portions of a hypertext (contents, windows and buttons). A content element from the set C and a window element for the abstract display of the content from the set W, are mapped to each place in the Petri net. A logical button from the set B is mapped to each transition in the Petri net. P_d, the display projection, provides a mapping from the logical components of

the hypertext to the tangible representations, such as screen layouts, sound generation, video, etc. The layout of the windows and the way text information and buttons are displayed, is determined by P_d.

Execution Rules For Trellis Hypertext

The net execution rule in Trellis hypertext is a hybrid one, with a combination of a singleton transition firing rule (representing the actions of the hyperdocument reader) and a maximal transition firing rule (to allow simultaneous automatic or system-generated events). The execution rule works as follows.

- All the enabled transitions are identified. The enabled transitions set consists of both *timed out* ones (i.e., have been enabled for their maximum latency) and *active* ones (i.e., have not timed out).
- One transition from the group of active ones and a maximal subset from the group of timed-out transitions will be chosen for firing.

This two step identification of transitions to be fired is basically for modeling both reader and timer based activity in the hypertext. A reader may select a button (fire a transition) during the same time slot in which several system-generated events occur. In this case, the Trellis model gives priority to the reader's action by choosing the reader-fired transition first. When a transition is fired, a token is removed from each of its input place and a token is added to each of its output place.

The implication of the firing rules is such that the document content elements are displayed as soon as tokens arrive in places. The display is maintained for a particular time interval before the next set of outgoing transitions are enabled. After a transition t becomes enabled, its logical button is made visible on the screen after a specified period of time. If the button remains enabled without being selected by the reader, the transition t will fire automatically at its point of maximum latency. The way the hypertext Petri net is structured along with its timings describes the browsing actions that can be carried out. In effect, windows displaying document contents can be created and destroyed without explicit reader actions, control buttons can appear and disappear after periods of inactivity, and at the same time user interactive applications can be created with a set of active nodes. Petri nets being a concurrent modeling tool, multiple tokens are allowed to exist in the net. These tokens can be used to effect the

action of multiple users browsing one document or to represent multiple content elements being visible together.

Trellis Hypertext : An Example

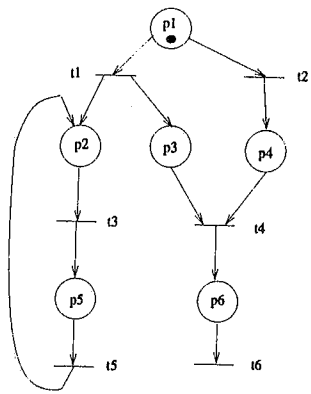


Figure 4 Guided tour using trellis hypertext.

We shall consider the guided tour example discussed in [7]. In a guided tour, a set of related display windows is created by an author. All the windows in a set are displayed concurrently. A tour is constructed by linking such sets to form a directed graph. The graph can be cyclic as well. From any one set of display windows, there may be several alternative paths. Figure 4 shows a representation of guided tour using the Trellis hypertext. Here, the set of windows to be displayed at any instant of time is described by a Petri net place. A place is connected by a transition to as many places as there are sets of windows to be displayed. A token is placed in the place(s) representing the first set of windows to be displayed. The actual path of browsing is determined by the user going through the information. For example, when the token is in *p1*, the information contents associated with *p1* are displayed and the buttons for the transitions *t1* and *t2* are selectable by the user.

Summary : The synchronous hypertext models both the logically linked structure of a hyperdocument and a timed browsing semantics in which the reader can influence the browsing pattern. The Trellis Hypertext model uses Petri net structure for representing user interaction with a database (basically for browsing actions). However, in the Trellis model, the user's inputs such as

freeze and restart actions, scaling the speed of presentation (fast forward or slow motion playout) and scaling the spatial requirements cannot be modeled. Another aspect in the Trellis model is that the user can interact with the hypertext only when the application allows him to do so (i.e., when the *buttons* can be selected by the user). Random user behavior where one can possibly initiate operations such as skip or reverse presentation at *any* point in time, are not considered in Trellis hypertext.

3.2 The Object Composition Petri Nets

The Object Composition Petri Net (OCPN) model has been proposed in [8, 12] for describing multimedia synchronization. The OCPN is an augmented Timed Petri Nets (TPN) model with values of time represented as durations and resource utilization being associated with each place in the net. An OCPN is defined as

C_{OCPN} = { T, P, A, D, R, M } where

R : **P** $\rightarrow$ { $r_1, r_2, \ldots$} represents the mapping from set of places to a set of resources.

other descriptions being same as that in the TPN model.

The execution of the OCPN is similar to that of TPNs where the transition firing is assumed to occur instantaneously and the places are assumed to have states. The firing rules for the OCPN are as follows :

1. A transition t_i fires immediately when each of its input place contain an *unlocked* token.
2. Upon firing the transition t_i, a token is removed from each of its input place and a token is added to each of its output place.
3. A place p_i remains in an *active* state for a specified duration τ_i associated with the place, after receiving a token. The token is considered to be in a *locked* state for this duration. After the duration τ_i, the place p_i becomes inactive and the token becomes *unlocked.*

It has been shown in [8, 12], that the OCPN can represent all the possible thirteen different temporal relationships between any two object presentation. The Petri nets have hierarchical modeling property that states that *subnets* of a Petri net can be replaced by equivalent abstract places and this property is applicable to the OCPN as well. Using the subnet replacement, an arbitrarily complex process model composed of temporal relations can be constructed with the OCPN by choosing pairwise, temporal relationships between process entities [8]. The OCPNs are also proved to be deterministic since no conflicts are modeled, transitions are instantaneous, and tokens remain at places for known, finite durations. OCPNs are also demonstrated to be *live* and *safe*, following the Petri nets definitions for these properties.

Synchronization Representation Using OCPN : An Example

We can consider a specific example orchestrated presentation and use the example to describe its OCPN representation. Figure 5 illustrates the media streams representation of the example, comprising of four streams of information : audio (A), motion video (V) and two image (I_1, I_2) streams. The synchronization characteristics of the presentation is such that audio and video objects are synchronized for every object. Image stream I_1 synchronizes with audio and video streams once in three object intervals and the stream I_2 synchronizes at the start and the end of presentation.

Figure 6 illustrates the OCPN model of the multimedia presentation example shown in Figure 5. The transitions shown in the net represent the points of synchronization and the places represent the processing of information. When the audio object represented by the place a_1 is presented completely, the token gets unlocked. Since the video object represented by the place v_1 is presented for the same duration as a_1, the place v_1 unlocks its token synchronously with place a_1. Now the common transition is fired immediately, thereby allowing the next set of video and audio objects to be presented. In a similar manner, the presentation of image object x_1 synchronizes with a_2 and v_2 and x_2 synchronizes with a_4 and v_4.

Summary : The OCPN represents a graph-based specification scheme for describing the temporal relationships in an orchestrated multimedia presentation. Comparing the OCPN with the Trellis Hypertext model, the Trellis model can have multiple outgoing arcs from places, and therefore can represent nondeterministic and cyclic browsing, with user interactions. The OCPN specifies

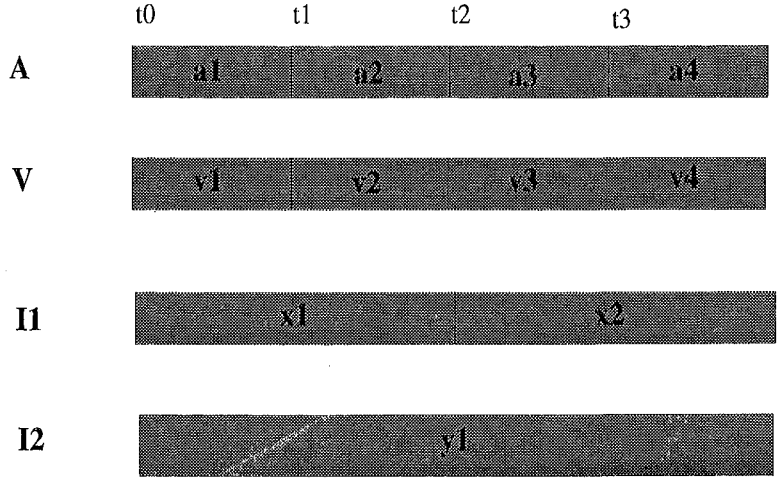


Figure 5 An example of multimedia presentation.

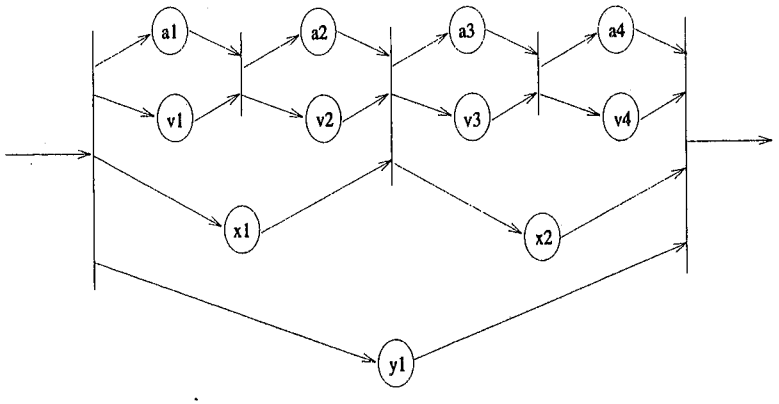


Figure 6 OCPN model for example in Figure 6.5.

exact presentation-time play-out semantics and hence useful in presentation orchestration.

The OCPN model ignores the spatial considerations required for composition of multimedia objects. The spatial characteristics can be assigned to the resource component of the OCPN model. Modeling the occurrence of spatial clashes (when two processes require the same window on the screen), however, cannot be done using the OCPN. Also, the OCPN model does not provide many facilities for describing user inputs to modify the presentation sequence. For instance, the user's wish to stop a presentation, reverse it, or skip a few frames cannot be specified in the existing OCPN architecture. Also, user inputs for freezing and resuming an on-going presentation, or scaling the speed or spatial requirements of a presentation cannot be described by the OCPN model.

3.3 Dynamic Timed Petri Nets

A *Dynamic Timed Petri Nets* (DTPN) model has been suggested in [16] by allowing user defined 'interrupts' to pre-empt the Petri net execution sequence and modify the time duration associated with the pre-empted Petri net process. In the DTPN model, nonnegative execution times are assigned to each place in the net and the notion of instantaneous firing of transitions is preserved. Basically, following types of modifications of execution time after pre-emption are allowed :

1. Deference of execution :
   For the operation of pre-emption with deference of execution, the remaining duration associated with the pre-empted Petri net place is changed considering the time spent till its pre-emption.

2. Termination of execution :
   The operation of pre-emption with termination is like premature ending of the execution.

3. Temporary modification of remaining time duration :
   The operation of pre-emption with modification of execution time is like 'setting' the time duration associated with the pre-empted Petri net *place* to a 'new value', as appropriately determined by the type of user input. For temporary modification of execution time, the *remaining time duration* associated with the place is modified.

4. Permanent modification of execution time duration :
   For permanent modification, the *execution time duration* associated with the place is modified.

DTPN Structure

In the DTPN model, pre-emption is modeled by using *escape arcs.* Escape arcs are marked by dots instead of arrow heads and they can *interrupt* an *active* Petri net place. Modification of execution time duration (temporary or permanent) associated with a place is modeled by *modifier arc.* Modifier arcs are denoted by double-lined arcs with arrow heads. A Dynamic Timed Petri Nets is defined as

DTPN = { T, P, A, D, M, E, C, C_m } where

C represents a set of escape arcs, C is a subset of P * T, and A and C are disjoint sets

C_m represents a set of modifier arcs, C_m is a subset of P * T, and A, C and C_m are disjoint sets

$E : P \rightarrow R$ represents *remaining duration* as a mapping from the set of places to the set of real numbers. Initially, E is set to *INVALID* before the activation of a place. After activation, E is set to a value equal to D. In case of pre-emption, E maintains the remaining time duration for which execution is to be carried out if the place is made active *again* by the firing of an input transition. After completion of the execution duration, E is set to INVALID again.

other descriptions being same as that in the TPN model.

A place p in a DTPN is an *escape place* of a transition t iff (p,t) is a member of the set C. The set of all escape places of t is denoted by *Esc(p)*, and the set of transitions connected by escape arcs with a place p is denoted by *Esc(t)*, $Esc(p) = \{t \mid p \in Esc(t)\}$. A transition is called a modifier transition if it has a modifier arc as an output arc. This notation is generalized in the usual way for sets of places and transitions. A typical DTPN structure with escape and modifier arcs is shown in Figure 7. The execution rules of the DTPN are discussed in [16]

Synchronization Models Using DTPN

The proposed DTPN can be effectively used in synchronization models for flexible multimedia presentation with user participation. DTPN constructions

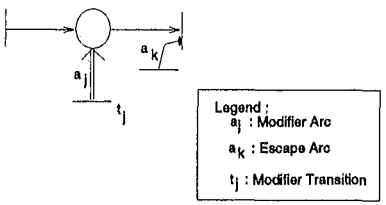


Figure 7 Dynamic Timed Petri Nets structure.

for describing handling of user inputs such as reverse presentation, freeze and restart to a *single object presentation* is the simplest case. These DTPN constructions for handling user inputs on single object presentations can be used in full multimedia presentation.

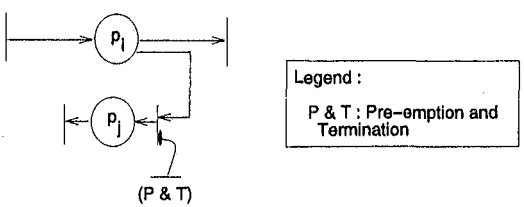


Figure 8 Reverse operation.

The reverse operation can be modeled as shown in Figure 8. Execution of p_i is pre-empted and terminated, and the transition to enable reverse presentation is fired. In a similar manner, freeze and restart operation can be modeled as shown in Figure 9. The type of interrupt to be applied to the execution sequence is pre-emption with deference of execution. The remaining time duration associated with p_i is modified to reflect the time spent till its pre-emption and the locked token in p_i is removed. A token is added to the output place p_j of the pre-empting transition. A large time duration is associated with p_j and its execution is pre-empted only on the receipt of *restart* signal from the user. Pre-emption of p_j causes the token to be 'returned' to the place p_i.

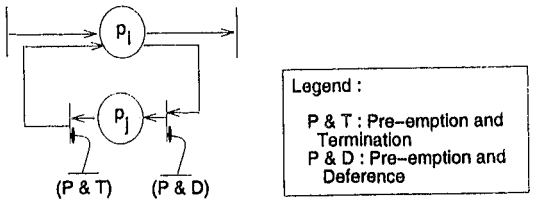


Figure 9 Freeze and restart operation.

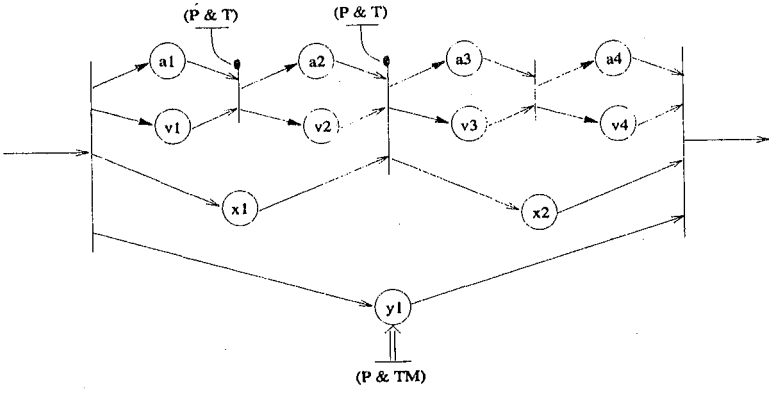


Figure 10 Skip operation for example in Figure 5

In the orchestrated presentation example discussed in Figure 5, consider skip operation on the object presentation x_1, when the objects a_1, v_1 and y_1 are being executed in parallel. The DTPN model for the skip operation is shown in Figure 10. Here, objects a_1, v_1, a_2, and v_2 must be skipped in the audio (A) and video (V) streams. Hence, the input of pre-emption followed by termination of execution (P&T) is applied for these objects. Object x_1 is also given the same input. For the object y_1 in the stream I_2, the execution duration must be modified to reflect the skip operation. This is effected by applying the input

pre-emption followed by temporary modification of execution time (P&TM) for y_1.

Summary : The DTPN model, its structure and the associated execution rules, can be adopted by the OCPN where resource utilizations are also specified. This augmented model can describe multimedia presentations with dynamic user participations.

4 FUZZY SYNCHRONIZATION MODELS

In [19, 20], multimedia synchronization involving independent sources for teleorchestra applications (remote multimedia presentation) has been considered. In the teleorchestra application, a user creates multimedia presentations using data objects stored in a distributed system. The distributed nature of the data objects may result in the non-availability of precise temporal relationships among the objects. However, *relative* or *fuzzy* temporal relationships can be specified among the objects to be presented. A Time-flow Graph (TFG) model for describing fuzzy temporal relationships has been proposed in [19, 20] where *temporal interval* is taken as a primitive. The terms *object X* and *interval X* are considered synonymous. One temporal interval may contain several objects in different media, i.e., several concurrent multimedia intervals.

4.1 Time-flow Graph Model

There are thirteen relations (seven relations and their inverses) that are considered between any two temporal intervals [5]. The relations are '**meets**', '**before**', '**equal**', '**overlap**', '**during**', '**start**', and '**finish**'. The other relations are their inverse, e.g., '**di**' is the inverse of the relation '**d**' (during). The following set R describes all the thirteen possible temporal relations.
$R = \{b, e, m, o, d, s, f, bi, mi, di, oi, si, fi\}$.
The temporal relationships among the involved objects can be parallel or sequential.

Sequential Relations in TFG : The sequential relation between any two intervals can be either 'meets' (**m**) or 'before' (**b**). In teleorchestra applications, multiple intervals can be involved in sequential relation requirement. Hence, the sequential relation specification provided in TFG are :

1. $A\{B\}$: Interval(s) in B will start after all the intervals in A are finished.
2. $< A > B$: Interval(s) in B will start when one of the intervals (the first) in A is finished.

Parallel Relations in TFG : A subset R_f ($R_f \in R$) is defined as $R = \{e, o, d, s, f, oi, di, si, fi\}$.
Considering two object intervals X and Y, X(r)Y describes the temporal relationship between the two intervals. When r = 's', the relation X(s)Y specifies that object X and Y are to be displayed with the same start time. In a teleorchestra application scenario, the temporal relationships have to be specified despite the lack of duration information of the involved intervals. The presentation semantics are hence defined in TFG models as follows [19, 20].

1. X(d)Y(d)Z : All the other objects are displayed during the presentation of the object with the longest presentation duration.
2. X(e)Y(e)Z : The display of all the objects are started simultaneously. The presentation of all the other objects will be cut off when one of the objects (first) is finished.
3. ch(X,Y,Z) = Y : The presentation duration of all the involved objects should equal the one chosen. Objects are displayed according to the relations $r \in R_f$ specified between every two of them. Presentation of some of the objects might be cut off to equal the chosen duration.

Hence, three duration specifications $r \in R_m = \{d, e, ch\}$, can be applied to presentations involving concurrent multiple intervals.

Using the above sequential and parallel relationship specification, multimedia presentation scenarios can be described. In TFG, the notation **N** is used to denote all the intervals contained in a scenario. The temporal relationship of an object interval N_x with other intervals is represented by the interval vector n_x. The interval vector n_x is defined as $n_x = (S_r, O_{id}, F_s, F_e)$ where S_r denotes the *source* (or the owner) of the interval, O_{id} the object identifier, F_s and F_e the presentation semantics chosen for the start and end of the display of the object. An interval vector can represent an object presentation or an intermission. The intermission vector, represented by n_τ, describes a presentation interval that is not mapped to any multimedia object. Intermissions are used to specify *gaps* in the multimedia presentation.

For describing multimedia presentations, the model of interval vectors and the involved temporal information are maintained in a Flow Graph (TFG). In TFG, intervals are described by nodes. A TFG is defined by the tuple $TFG = \{\Delta_N, N_t, E_d\}$ where Δ_N is a set of nodes for the interval vectors, N_t is a set of transit nodes and E_d is a set of directed edges. The model Δ_x of an interval vector n_x is composed of an interval node N_x, representing the interval of n_x, and δ node(s), representing its parallel relations to other intervals. N_x may associate none, one or two δ nodes. An intermission node has no δ nodes. The sequential specifications $\{A\}B$ and $< A > B$ are represented by the transit nodes in N_t, the *sq-node* and the *tri-node* respectively.

4.2 Synchronization Specification Using TFG: An Example

The TFG specifications for the relations A *ends* B and A *overlaps* B are shown in Figure 11(i) and (ii). The square nodes N_s and N_e are the *sq-nodes* representing the sequential relation {A}B. Figure 11(ii) has intermission node N_τ to describe the time lag between the event A and B. The δ nodes are used in Figure 11(ii) to signify the end of the concurrent presentation. The TFG model for the orchestrated presentation example (discussed in Figure 5) is shown in Figure 11.

Summary : The TFG model for multimedia synchronization can handle relative and imprecise temporal requirements in teleorchestra applications. The advantage in the TFG model is that no accurate temporal information, the duration value or the occurring points, is required. The TFG can represent all the possible temporal relations involved in a multimedia presentation scenario. Comparing the TFG model with the earlier Petri nets based ones, the Petri nets based models rely on the values for the duration of presentation in formulating the temporal specification. Hence, the Petri nets based models cannot represent the relative synchronization requirements. However, the TFG model does not address the issue of dynamic user participation during a multimedia presentation.

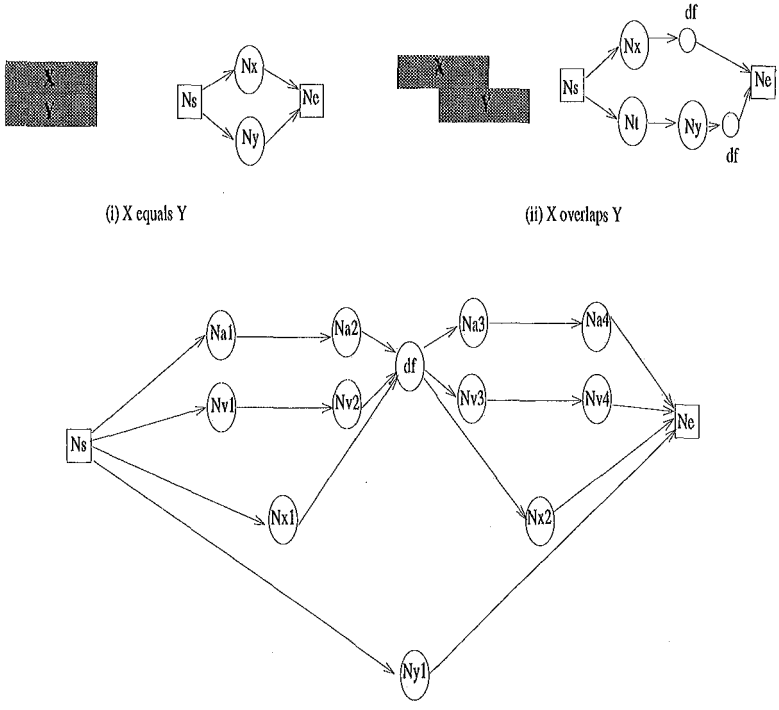


Figure 11 TFG synchronization models.

5 CONTENT-BASED INTER-MEDIA SYNCHRONIZATION

Content-based inter-media synchronization is based on the semantic structure of the multimedia data objects [21]. Here, a media stream is viewed as hierarchical composition of smaller media objects which are logically structured based on their contents. The temporal relationships are then established among the logical units of the media objects. The logical units of a media stream are the

semantic events that are either manually identified *a priori* or automatically detected by analysis of the media contents.

Traditional approaches for synchronization discussed in the earlier sections consider each media stream as being composed of set of objects to be presented at specified time intervals. Here, the synchronization specifications are given for describing concurrent relationships among the presentation of objects belonging to different media streams. Following these approaches, a segment of a media stream cannot be manipulated without re-establishing the temporal relationships among all other related media streams. Content-based synchronization, however, allows such manipulations to be done more easily. As an example, an audio stream can be dubbed onto a video stream in movie editing very easily following content-based synchronization approach.

In this section, we discuss the content-based synchronization approach discussed in [21].

5.1 Hierarchical Classification of Multimedia Objects

The top-most member in the hierarchy is an individual media stream that is considered as a *composite-object*. Let us consider a multimedia lecture on the topic *Distributed Multimedia Systems*. The video source of the lecture is a composite-object. A composite-object consists of *segment* objects. A segment is defined as an episode. The lecture presentation on Distributed Multimedia Systems can consist of the following segments : Media Characteristics (compression, coding, etc.), File System requirements, Device driver requirements, Network requirements and Distributed multimedia applications. A segment object in turn is composed of *event* objects. An event object is identified by theme changes in a segment object. As an example, the segment on network requirements can be composed of Quality of Service (QoS) requirements, network protocol features and network access methods. An event is composed of a set of *shot* objects. A shot is defined as a sequence of video frames that contains pictures taken under the same angle of a camera. The hierarchical classification of the lecture presentation on Distributed Multimedia System is illustrated in the Figure 12. Each node in this hierarchical structure is an abstraction of component objects where information such as component object IDs, temporal relationships among them, etc. is stored.

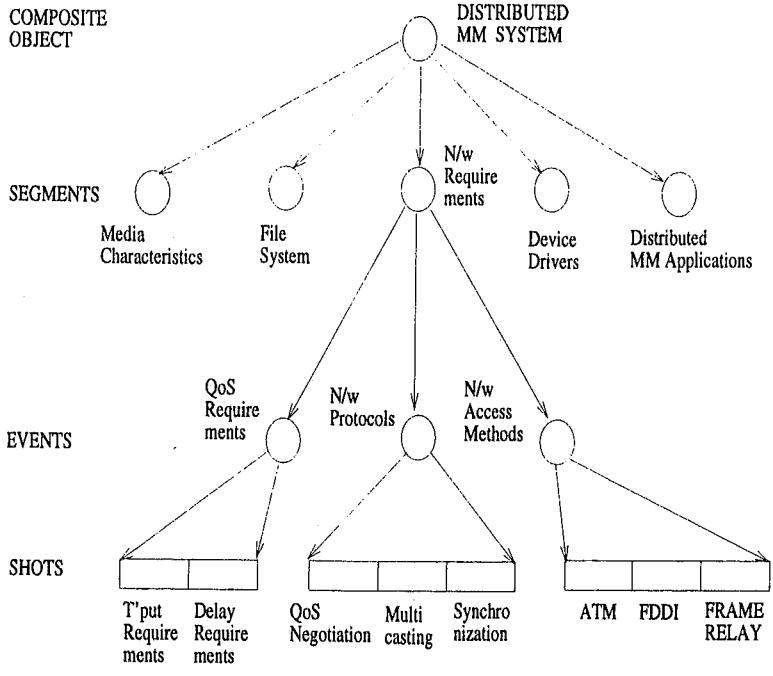


Figure 12 Hierarchical classification of objects.

5.2 Temporal Relations

The temporal relationship among media objects in content-based approach is specified with respect to their component media objects only. The temporal relationships among component objects is defined by the term *synchronization schedule*. A synchronization schedule statement consists of *Node IDs* and *operators*. *Node ID* describes the object to be presented. An *operator* is defined as an infix symbol that dictates the temporal relation between two objects. A *sequential* operator (;) and a *simultaneous* operator (||) are used for describing the synchronization relationships. Considering two nodes A and B, $A;B$ implies that the activity B starts at the end of the activity A and $A \parallel B$ implies that the two activities go on parallelly. Using a combination of these two operators, the thirteen different possible temporal relations between media objects can be described.

The synchronization schedule can be created by the following algorithm given in [21]. This algorithm works on the hierarchical structure of the multimedia object.

1. **Do** depth first search on each subtree whose root node is a direct child of the ROOT node and create an operation schedule for each.
2. Choose a subtree **A** whose *begin[nodeID] = self.*
3. Choose another subtree **B**.
4. **If** (B's *begin[nodeID] = self*) *then*
   { add B's first object ID to A's first object ID with a || operator, B's second to A's second with a || operator, and so on until whichever runs out of its IDs first.

   if A runs out of it first **then** just add B's each object ID to the end of A's schedule with a ; operator. }

   else (B's *begin[nodeID]* $\neq$ *self*)
   { identify the segment that contains the object ID which is given for the value of B's *begin[nodeID]*

   if it is identified **then** from the identified object ID do the same adding operation as the first part of the step 4 (**If** clause). i.e., the synchronization schedule is created at this point.}

   else (it fails to be identified - this means that a user tries to bring a media object from the outside of the current object hierarchy and to compose with the current objects) { error.}
5. Repeat the steps 3, 4, 5 until all the segments are chosen and operated.

We can use the above algorithm to form the synchronization schedule for the example, lecture on Distributed Multimedia Systems, shown in Figure 12. For the segment on network requirements of distributed multimedia systems, the synchronization schedule will be :
throughput requirements; delay requirements; QoS negotiation; multicasting; synchronization; ATM; FDDI; Frame Relay.

Summary : The content-based synchronization model suits well for content-based multimedia information retrieval. The model has several advantages. It can be used to artificially *modify* or *create* synchronization between the involved

media. For example, the asynchrony in video and audio due to the differences in speeds of light and sound can be modified using the content-based synchronization scheme. In a similar manner, the scheme can be used to create a new synchronization specification between video and a dubbed audio track during movie editing.

6 MULTIMEDIA SYNCHRONIZATION AND DATABASE ASPECTS

The approaches discussed so far describe effective ways of modeling the temporal requirements of an orchestrated multimedia application. The multimedia objects have to be logically structured in a multimedia database and the structure should reflect the synchronization characteristics of the multimedia presentation. Also, multimedia data has to be delivered from a storage medium based on a predefined retrieval schedule. The size and the real-time characteristics of the multimedia objects necessitate different storage architectures. In this section, we describe the database schema representation and physical storage representation of multimedia objects with respect to the synchronization characteristics.

6.1 Database Schema Representation

Modeling of the synchronization characteristics of a multimedia presentation using the OCPN or the DTPN or the TFG approach provides a convenient visual technique for capturing the temporal relationships. However, a conceptual database schema is needed which preserves the semantics of the synchronization representation model to facilitate reproduction, communication, and storage of multimedia presentation. Synchronization models basically identify and group the temporally related multimedia objects of increasing complexity.

In [12, 8], a hierarchical synchronization schema has been proposed for multimedia database representation. Two types of nodes - terminal and nonterminal nodes - have been defined in this approach. The terminal nodes in this model indicate base multimedia objects (audio, image, text, etc.) and the nodes points to the location of the data for presentation. The nonterminal nodes have additional attributes defined for facilitating database access. The attributes include timing information and node types (sequential and parallel), allowing the assembly of multimedia objects during the presentation. The timing information

in the nonterminal node includes a time reference, playout time units, temporal relationships and required time offsets for specific multimedia objects. Figure 13 shows the hierarchical database schema for the multimedia presentation example described in Figure 5.

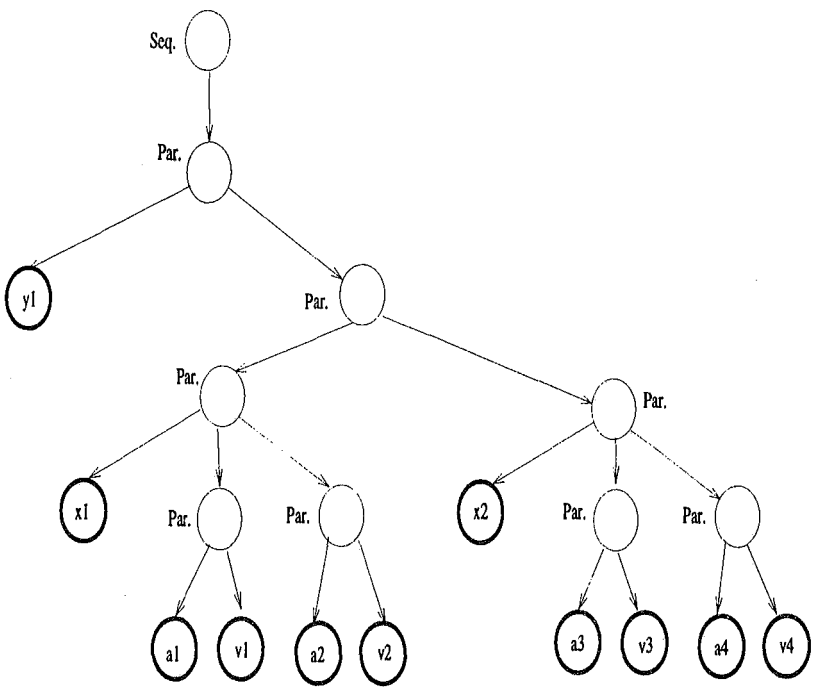


Figure 13 Hierarchical database schema for Figure 6.5.

6.2 Physical Storage Requirements

The physical medium used for storing multimedia objects should be able to meet the synchronization requirements of a multimedia application, both in terms of the storage capacity and bounds on retrieval time. Multimedia objects such as audio and video require very large amounts of storage space. For example, a data rate of about 2 Mbytes/second is required for HDTV video. Apart from the storage technology requirements, storage architectures adopted by the operating system also become important. The reason is that data must

be retrieved at a very high rate for HDTV video objects, e.g., 2Mbytes/second, from the disks.

Hence, the file system organization has to be modified for handling digital video and audio files. The aim is to handle multiple huge files as well as simultaneous access to different files, given the real-time constraint of data rates upto 2 Mbytes/second. This problem has been studied in detail in [18]. Most of the existing storage architectures allow unconstrained allocation of blocks on disks. Since there is no constraint on the separation between disk blocks storing a chunk of digital video or audio, bounds on access and latency times cannot be guaranteed. Contiguous allocation of blocks can guarantee continuous access, but has the familiar disadvantage of fragmentation of useful diskspace. *Constrained block allocation* can help in guaranteeing bounds on access times without encountering the above problems. For constrained allocation, factors like size of the blocks (granularity) and separation between successive blocks (scattering parameter) have to be determined for ensuring guaranteed bounds [18]. The retrieval schedule of data for multimedia objects can be affected when the system becomes busy with some other tasks. The allocation or the data placement schemes also have to take into consideration the factor of contention with other processes in the system.

Summary : Multimedia objects composing orchestrated presentations need to be stored in database(s). The logical storage structure or the schema should reflect the synchronization characteristics of the orchestrated presentation. Also, the storage of the multimedia objects should satisfy the synchronization requirements of the orchestrated presentation in terms of the bounds on object retrieval time.

7 MULTIMEDIA SYNCHRONIZATION AND OBJECT RETRIEVAL SCHEDULES

Orchestrated multimedia presentations might be carried out over a computer network thereby rendering the application distributed. In such distributed presentations, the required multimedia objects have to be retrieved from the server(s) and transferred over the computer network to the client. The communication network can introduce delays in transferring the required multimedia objects. Other conditions such as congestion of a database server at a given

time and locking of the data objects by some other application also have to be considered. Retrieval of the multimedia objects have to be made keeping in mind these delays that might be introduced during the presentation. A retrieval scheduling algorithm has to be designed based on the synchronization characteristics of the orchestrated presentation incorporating features for allowing the delays that might be encountered during the presentation.

In [12, 15], a multimedia object retrieval scheduling algorithm has been presented based on the synchronization characteristics represented by the OCPN. Characterizing the properties of the multimedia objects and the communication channel, the total end-to-end delay for a packet can consist of the following components.

- Propagation delay, D_p
- Transfer delay, D_t, proportional to the packet size
- Variable delay, D_v, a function of the end-to-end network traffic.

The multimedia objects can be very large and hence can consist of many packets. If an object consists of r packets, the end-to-end delay for the object is : $D_e = D_p + rD_t + \sum_{j=1}^{r} D_{v_j}$
Control time T_i is defined as the skew between putting an object i onto the communication channel and playing it out. Considering the end-to-end delay, D_e, the control time T_i should be greater than D_e. The various timing parameters, the playout time (π), the control time (T) and the *retrieval time* (ϕ) are as shown in Figure 14. The retrieval time for an object i (ϕ_i) or the object production time at the server is defined as $\phi_i = \pi_i - T_i$.

The above retrieval schedule is for a single object in a media stream. When multiple objects are retrieved, the timing interaction of the objects have to be considered. An optimal schedule for multiple objects is defined as one which minimizes their control times [12, 15]. The constraints associated with the determination of the minimum control time for a set of objects are as follows.

- An object cannot be played out before arrival, i.e., $\pi_i \geq \phi_i + T_i$.
- The minimum retrieval time between successive objects, i.e., $\phi_{i-1} \leq \phi_i - T_{i-1} + D_p$.

Following these constraints, an optimal retrieval schedule can be worked out. An optimal retrieval time for the final, mth object, is $\phi_m = \pi_m - T_m$. The

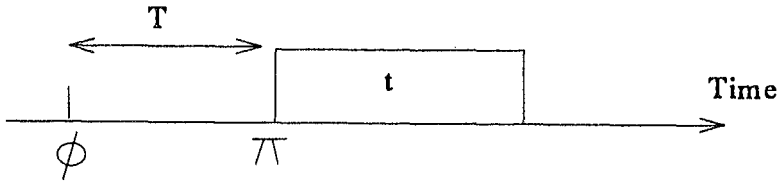


Figure 14 Delay factors in object retrieval.

retrieval times for the other objects can be worked out backwards based on the schedule ϕ_m for the final object. The scheduling algorithm given in [12, 15] is summarized as follows.

$\phi_m = \pi_m - T_m$
for i = to m-2
if $(\phi_{m-i} < \pi_{m-i-1} - D_p)$ $\phi_{m-i-1} = \phi_{m-i} - T_{i-1} + D_p$
else $\phi_{m-i-1} = \pi_{m-i-1} - T_{m-i-1}$
end.

Retrieval Schedule Example : Consider the orchestrated presentation shown in Figure 5. We can apply the retrieval schedule for the image stream I_1 with following assumptions. Let the channel capacity, C, be 10 Mbps. Let the size of the image objects (assuming color image with 1024 * 1024 pixels and 24 bits/pixel of color information) be 24 Mbits. Let D_p, the propagation delay, and D_v, the variable delay, be 100 milli-seconds each. Then the transfer delay D_t is 2.4 seconds. Then, the retrieval schedule for the I_1 stream looks as follows.
Schedule = {-2.6, 0}
This implies that the first object x_1 is to be retrieved 2.6 seconds before the start of the presentation.

Summary : In this section, we discussed how an optimal retrieval schedule can be designed based on the synchronization characteristics of multimedia objects. The synchronization characteristics, as defined by the OCPN or the DTPN, specifies the object playout time instants π. The optimal retrieval

scheduling algorithm works on the fact that these playout time instances are to be satisfied given the end-to-end delay D_e involved in the transfer of multimedia objects. In the TFG model, the playout instances (π) are for the multimedia objects are described in a *fuzzy* or relative manner. This fuzzy temporal relations have to be converted into absolute schedules for retrieving the objects from a server. In [20], retrieval scheduling algorithms have been designed for the TFG specification of the synchronization characteristics.

8 MULTIMEDIA SYNCHRONIZATION AND COMMUNICATION REQUIREMENTS

In a distributed orchestrated multimedia presentation, the communication network provides support for transfer of data in real-time. The synchronization characteristics of an orchestrated presentation define a *predictable* sequence of events that happen in the time domain. This sequence of events can be used by the network service provider to understand the behavior of the orchestrated application in terms of the Quality of Service (QoS) requirements and the network load that might be generated [17, 22, 23]. The QoS parameters are characterized by a set of parameters such as the end-to-end throughput, the end-to-end delay and packet loss probabilities. The offered network load is characterized by the traffic that might be generated by the application.

8.1 QoS Requirements of an Orchestrated Presentation

In a distributed orchestrated presentation, it is essential that the object is available at the client before the presentation. In general, the client can adopt two different strategies for buffering the multimedia objects : minimum buffering strategy (B1) and maximum buffering strategy (B2). The B1 strategy tries to minimize the buffer requirements by buffering atmost one object or a frame, as the case may be, before its presentation. In the B2 strategy, the approach is to buffer upto a certain limit (say B_{max}) for each media stream on the client side, before the presentation. This implies that more than one object in a media stream will be buffered by the client during the presentation sequence.

The B1 strategy minimizes the buffer space requirements of the client and the QoS derived based on this strategy gives the *preferred* values for the client. The QoS requirements derived, based on the B2 strategy, specifies the *acceptable* values for the client. In a distributed orchestrated presentation, multimedia objects composing the presentation are retrieved from the server. The retrieval of objects do not impose any real-time demands from the network service provider. Hence, for orchestrated presentations, it is sufficient if the network service provider guarantees the required throughput.

Computation of Preferred Throughput :

For objects such as still images, we can determine the average throughput required by the application with the B1 buffering strategy, assuming that atmost one object in each multimedia stream is buffered by the application on the client system before the presentation. For objects such as video that consists of a set of frames to be presented at regular intervals, the application following the B1 strategy can buffer atmost one frame of the video object. Let us consider a multimedia stream with an object O_i at a playout time instant t_i and let the object size be Z_{O_i}. Since only one object is assumed to be buffered before the playout time instant for the stream, the retrieval of objects can be started only after the immediately preceding playout time instant t_{i-1} and has to be completed before t_i. Hence, the preferred throughput C_{app}^{pref} is [23] :

$$C_{app}^{pref}[t_{i-1}, t_i] \geq \frac{Z_{O_i}}{t_i - t_{i-1}}$$

Computation of Acceptable Throughput :

For calculating the *acceptable* QoS parameters, we should find out the minimum values that are required by the application. A minimum value of throughput (C_{app}^{acc}) implies that the application will be following the B2 buffering strategy of buffering more than one object (in the stream for which throughput is being calculated) before its presentation. When more than one object in a stream is buffered by the application, the start of the presentation is delayed by the time required for retrieving B_{max} bits using the acceptable throughput of C_{app}^{acc}. If B_{max} is the maximum buffer space available and $\sum_{i=1}^{n} Z_{O_i}$ is the total size of all objects to be retrieved, then the acceptable throughput is [23] :

$$C_{app}^{acc} \geq \frac{(\sum_{i=1}^{n} Z_{O_i} - B_{max})}{t_{final} - t_{initial}}$$

QoS Computation - An Example

Let us consider the orchestrated presentation example discussed in Figure 5. In the video stream V in Figure 5, we can assume an uniform frame interval with 10 frames/second and a frame size of 2 Mbits for the objects $v_1, v_2..., v_4$. Let us assume a uniform time interval of 10 seconds for presentation of the video objects $(v_1, v_2, ..)$. The preferred QoS requirement of the application is 20 Mbps. For calculating the acceptable QoS, let us assume the maximum buffer space (B_{max}) available as 200 Mbits. The acceptable QoS will then be 15 Mbps. The preferred and acceptable QoS is shown in Figure 15. The preferred QoS values are required from the start of the presentation (with sufficient time for retrieving the first object) till the end of presentation. The acceptable QoS values are required from a time Γ seconds before the start of the presentation for retrieving B_{max} bits. ($\Gamma = B_{max}/C_{app}^{acc}$). In this example, Γ is 13.33 seconds.

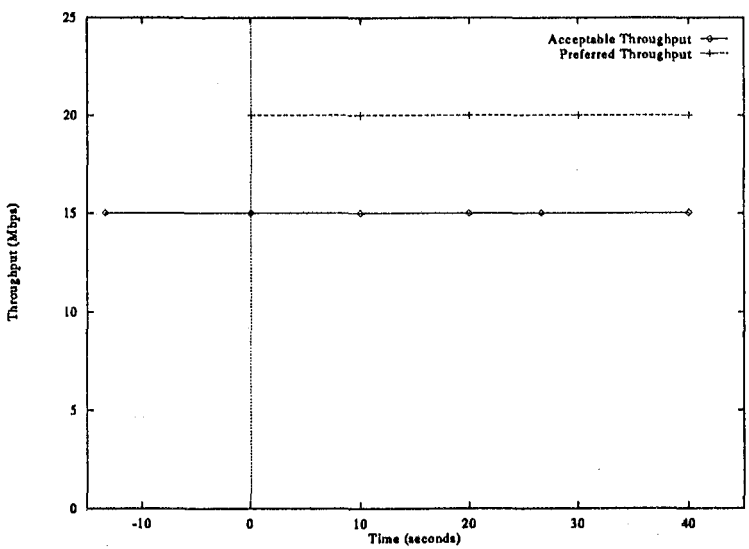


Figure 15 Throughput for stream V in Figure 6.5.

8.2 Traffic Source Modeling

The synchronization characteristics of an orchestrated presentation describes a sequence of objects with an associated duration of presentation, to be presented at different time instants. This sequence gives an implicit description of the traffic associated with the orchestrated presentation [23]. However, the traffic generated by an orchestrated presentation server also *depends on the object retrieval schedule* adopted by the client going through the presentation. This retrieval schedule basically determines the time instant(s) at which the client wants to receive the object(s). This schedule depends on the buffering that can be done at the client side. With the minimum buffering strategy (B_1), the delivery time of an object (or a frame, in case of video objects) is the *presentation time* of the previous object. As an example, object O_i will be delivered from the server at t_{i-1} just after the presentation time instant t_{i-1} of the object O_{i-1}. With maximum buffering strategy B_2, the delivery schedule at the server is such that B_{max} bits will be delivered from the server every Γ seconds, where $\Gamma = B_{max}/C_{app}^{acc}$. C_{app}^{acc} is the minimum acceptable throughput that should be offered by the network for a multimedia stream with the B_2 buffering strategy.

Traffic Source Model Example : Consider the orchestrated presentation example shown in Figure 5. The assumptions made in Section 8.1 for computing the QoS requirements of the video stream V can be used for deriving the stream's traffic characteristics. In addition, let the network packet size, p, be 100 bits. With the B1 strategy, the minimum throughput required from the network (C_{app}^{pref}) will be 20 Mbps. Figure 16 shows the traffic generated for the video stream using the minimum buffering strategy B_1. Delivery of the first frame will start 0.1 seconds before the start of the presentation. Each frame is of size $2*10^6$ bits and hence $2*10^4$ packets ($framesize/p$) will be generated every 0.1 seconds. For the B2 strategy, let us assume a maximum buffer space (B_{max}) of 200 Mbits for the video stream. The minimum throughput needed from the network (C_{app}^{acc}) will be 15 Mbps. With these assumptions, $2 * 10^6$ packets (B_{max}/p) will be generated by the server every $\Gamma = B_{max}/C = 13.33 seconds$. The initial chunk will be delivered 13.33 seconds before the presentation. Figure 17 shows the traffic generated for the video stream V in Figure 5 with maximum buffering strategy B_2. It should be noted that the origin in the X-axis corresponds to the presentation start time.

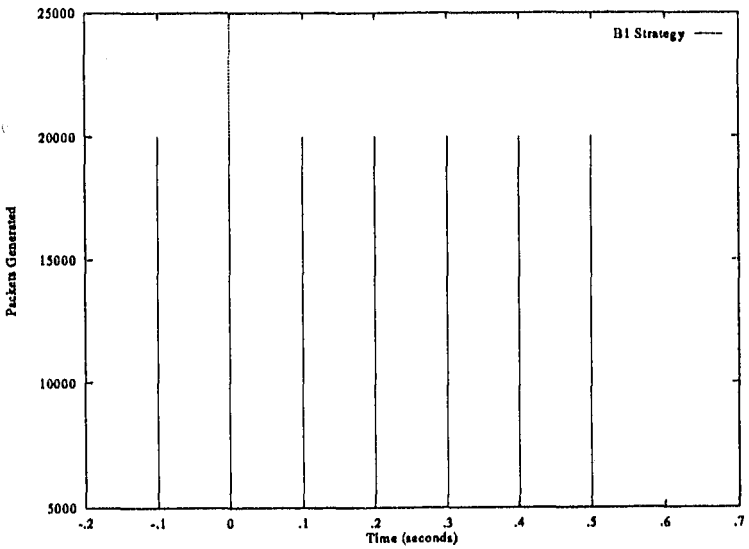


Figure 16 Traffic for stream V in Figure 6.5, with B1 strategy

9 SUMMARY AND CONCLUSION

Distributed orchestrated multimedia presentation applications such as multimedia lecture presentations, multimedia databases and on-demand multimedia servers are increasingly becoming popular. An orchestrated application has a synchronization characteristic that specifies the time instants at which the presentation of objects in the media streams must synchronize. This synchronization characteristic is specified in the form of pre-defined temporal relations and are stored along with the multimedia database. In this Chapter, we presented the problem of specifying the synchronization characteristics of an orchestrated multimedia presentation. We discussed the methodologies that have been proposed in the literature for describing the synchronization characteristics. The methodologies use concurrent programming language approach or graphical approach or content based approach. We then studied the database representation of the synchronization characteristics.

The synchronization characteristics of the presentation describe a *predictable* pattern of events that happen in the time domain. In a distributed orchestrated presentation, this pattern of events can be used to determine the object retrieval schedule that is to be adopted by a client. It can also be used by the

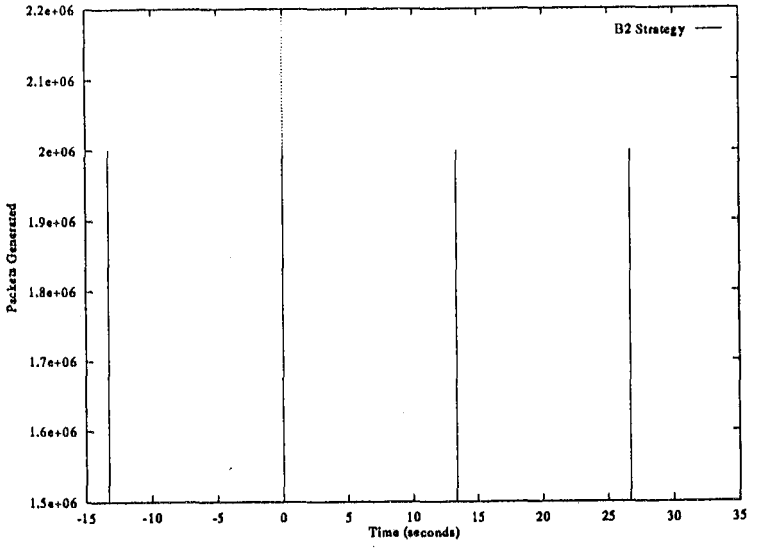


Figure 17 Traffic for stream V in Figure 6.5, with B2 strategy

network service provider to understand the QoS requirements of orchestrated applications and its network traffic generation characteristics. In [22, 23], an approach based on the Probabilistic Attributed Context Free Grammar (PACFG) has been proposed for deriving the QoS requirements and the network traffic generation characteristics of orchestrated multimedia presentation based on its synchronization characteristics. Based on these studies, protocols have been specified for multimedia synchronization [12] and for handling QoS negotiations in orchestrated presentation [23]. The traffic source model of an orchestrated presentation, based on its synchronization characteristics, can be used for simulation studies for assessment of network performance.

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ATTACHMENT 7

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Table of Contents — Volume 2

General Chair's Message xviii

Reviewers xix

SESSION TE I: Database Applications
Chair: Sumeet Dua

Performance Evaluation of Block-Based Motion Estimation Algorithms and Distortion Measures 2
S. Subrarnanya, H. Patel, and I. Ersoy

Geoblock: A LVQ-Based Framework for Geographic Image Retrieval 8
L. Zhu

Language Model-based Retieval for Farsi Documents 13
K. Taghva, J. Coombs, R. Pareda, and T. Nartker

Summarizing Inter-Query Learning in Content-Based Image Retrieval via Incremental Semantic Clustering 18
I. Gondra and D. Heisterkamp

A Framework for Trajectory Based Visual Event Retrieval 23
I. Ersoy, F. Bunyak, and S. Subrarnanya

SESSION TE II: Distributed Grid System I
Chair: Maria Mirto

Detecting Anomalies in High-Performance Parallel Programs 30
G. Florez, Z. Liu, S. Bridges, R. Vaughn, and A. Skjellum

Grid Workflow Based on Dynamic Modeling and Scheduling 35
S. Zhang, N. Gu and S. Li

Extensible Communication Architecture for Grid Nodes 40
N. Mohamed, J. Al-Jaroodi, and H. Jiang

Access Policy Specification for Web Applications 45
S. Barker

A Web / Grid Portal Implementation of BioSimGrid: A Biomolecular Simulation Database 50
B. Wu, M. Dovey, M. Ng, K. Tai, S. Murdock, P. Jeffreys, S. Cox, J. Essex, and M. Sansom

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Kansas City, Mo.

SESSION TE III: Distributed Grid System II

Chair: Maria Mirto

A Problem Solving Environment for Remote Sensing Data Processing 56
G. Aloisio, M. Cafaro, I. Epicoco, and G. Quarta

A Demonstration of Collaborative Web Services and Peer-to-Peer Grids 62
M. Wang, and G. Fox, and S. Pallickara

On the Matching of Events in Distributed Brokering Systems 68
S. Pallickara and G. Fox

Performing Security Analysis of Large Scale Power Systems with a Broker-Based Computational Grid 77
M. Di Santo, N. Ranaldo, D. Villacci, and E. Zimeo

G-AQFS: Grid Computing Exploitation for the Management of Air Quality in Presence of Complex Meteorological Circulations 83
G. Aloisio, M. Cafaro, R. Cesari, C. Mangia, G. Marra, M. Miglietta, M. Mirto, U. Rizza, I. Schipa, and A. Tanzarella

SESSION TE IV: Distributed Grid System III

Chair: Maria Mirto

Integrating Ontology and Workflow in PROTEUS, a Grid-Based Problem Solving Environment for Bioinformatics 90
M. Cannataro, C. Cornito, A. Guzzo, and P. Veltri

Grid Job Builder—A Workflow Editor for Computing Grids 95
C. Jung, M. Einhoff, S. Noll, and N. Schiffner

The Cost-Effective Critical Path Approach for Service Priority Optimization in the Grid Computing Economy 100
M. Lin and Z. Lin

OGSA-WebDB: An OGSA-Based System for Bringing Web Databases into the Grid 105
S. Pahlevi and I. Kojima

POSTER SESSION - I

Effectiveness of Advanced and Authenticated Packet Marking Scheme for Traceback of Denial of Service Attacks 111
B. Rizvi and E. Fernández-Gaucherand

Vulnerability Scanning for Buffer Overflow 116
A. Iyer and L. Liebrock

Disaster Coverable PKI Model Based on Majority Trust Principle 118
V. Tzvetkov

A Novel Relevance Feedback Method in Content-Based Image Retrieval 120
B. Li and S. Yuan

OntoTag's Linguistic Ontologies: Improving Semantic Web Annotations for a Better Language Understanding in Machines 124
G. de Cea, I. de Mon, A. Gómez-Pérez, and A. Pareja-Lora

Bidding in P2P Content Distribution Networks Using the Lightweight Currency Paradigm 129
E. Elrufaie and D. Turner

Improving Classification Performance for Heterogeneous Cancer Gene Expression Data 131
B. Fung and V. Ng

Monitoring the Development Process with Eclipse 133
A. Sillitti, A. Janes, G. Succi, and T. Vernazza

Modeling a Grid-Based Problem Solving Environment for Mobile Devices 135
S. Kurkovsky, Bhagyavati, A. Ray, and M. Yang

POSTER SESSION - II

An Integrated Neighborhood Dependent Approach for Nonlinear Enhancement of Color Images 138
L. Tao and V. Asari

Extendible Range-Based Numbering Scheme for XML Document 140
G. Xing and B. Tseng

An Extension of XQuery for Moving Objects over GML 142
W. Chung, S.-Y. Park, and H.-Y. Bae

An Evaluation of New and Old Similarity Ranking Algorithms 148
P. Lynch, X. Luan, M. Prettyman, L. Mericle, E. Borkmann, and J. Schlaifer

Experiments on a Secure Compression Algorithm 150
E. Celikel and M. Dalkilic

A GCD Attack Resistant CRTHACS for Secure Group Communications 153
X. Zou, B. Ramamurthy, and S. Magliveras

A Distributed Quadtree Dictionary Approach to Multi-resolution Compression 155
R. Dooley

Face Detection Technique Based on Rotation Invariant Wavelet Features 157
S. Gundimada and V. Asari

Integrating Compression with Watermarking on Video Sequences 159
A. Giannoula and D. Hatzinakos

Session WA I: Learning / Education

Chair: Y. Alp Aslandogan

Fuzzy Measures and Integrals for Evaluating Strategies 162
Y. Narukawa and V. Torra

How to Make E-cash with Non-repudiation and Anonymity 167
R. Song and L. Korba

A Workshop on Advanced Separation of Concerns and Aspect-Oriented Programming 173
D. Dechow

Applied Fieldbus Knowledge for ICT Engineers 178
P. Mariño, H. Hernández, M. Domínguez, F. Poza, F. Machado, and F. Vázquez

An Approach to Improving the Quality of Part-of-Speech Tagging of Chinese Text 183
Y.-L. Qian and J.-H. Zheng

Ensembles of Partitions via Data Resampling 188
B. Minaei-Bidgoli, A. Topchy, and W. Punch

Choosing the Initial Set of Exemplars When Learning with an NGE-Based System 193
L. Figueira and M. Nicoletti

The Effects of Business Rules on Transactional Association Analysis 198
R. Hashemi, L. Le Blanc, and B. Westgeest

Information Technologies for Education & Training in E-Government 203
R. Bose

Routine Learning: Analyzing Your Whereabouts 208
S. Pirttikangas, J. Riekki, and J. Röning

Session WA II: Information Retrieval

Chair: Nazli Gohrian

Information-Content Based Sentence Extraction for Text Summarization 214
D. Mallett, J. Elding, and M. Nascimento

Measuring the Scalability of Relationally Mapped Semistructual Queries 219
R. Cathey, S. Beitzel, E. Jensen, A. Pilotto, and D. Grossman

Modified LZW Algorithm for Efficient Compressed Text Retrieval 224
N. Zhang, T. Tao, R. Satya, and A. Mukherjee

A Unique-Order Interpolative Code for Fast Querying and Space-Efficient Indexing in Information Retrieval Systems 229
C.-S. Cheng, J. Shann, and C.-P. Chung

Turkish Word N-gram Analyzing Algorithms for a Large Scale Turkish Corpus – TurCo 236
Y. Çebi and G. Dalkiliç

Content-Based Image Retrieval Incorporating Models of Human Perception 241
M. Celebi and Y. Aslandogan

Use of Multiple Algorithms in Image Content Searches 246
J. Parker and B. Behm

Session WA III: Mobile Enterprise I

Chair: Elaine Lawrence

How $M=Ec^2$ in Healthcare 252
N. Wickramasinghe and S. Goldberg

Enhanced Cell Visiting Probability for QoS Provisioning in Mobile Multimedia Communications 258
M. Islam, M. Murshed, and L. Dooley

A Secure Electronic Examination Protocol Using Wireless Networks 263
J. Herrera-Joancomartí, J. Prieto-Blázquez, and J. Castellà-Roca

Threats to the Mobile Enterprise: Jurisprudence Analysis of Wardriving and Warchalking 268
E. Lawrence and J. Lawrence

Registration and Discovery of Services in the NetTraveler Integration System for Mobile Devices 274
M. Rodríguez-Martínez, J. Enseñat, E. Pagan, J. Arzola, M. Sotomayor, and E. Vargas

A Two-Tier Architecture for Automated Mobile Applications 281
R. Steele, Y. Ventsov, S. Madhisetty, and L. Benkovich

SESSION WA IV: Language Understanding

Chairs: Fuji Ren and Qiong Liu

Lexical-Chain and Its Application in Text Fitering 288
L. Shaozi, Y. Wenjian, L. Tangqiu, and C. Huowang

Problems and Solutions in Machine Translation Involving Arabic, Chinese and French 293
H. Alsharaf, S. Cardey, P. Greenfield, and Y. Shen

Internet Archive as a Source of Bilingual Dictionary 298
M. Fattah, F. Ren, and K. Shingo

Integrating Speech Enabled Services in a Web-Based e-Learning Environment 303
S. Werner, M. Wolff, M. Eichner, and R. Hoffmann

Source Signal Based Rate Adaptation for GSM AMR Speech Codec 308
J. Makinen and J. Vainio

Linguistic Knowledge and Automatic Semantic Representation of Emotions and Feelings 314
Y. Mathieu

Word Statistics of Turkish Language on a Large Scale Text Corpus – TurCo 319
G. Dalkihç and Y. Çebi

Session WB I: Potpourri I

Chair: Roy Pargas

An Informed Operator Approach to Tackle Diversity Constraints in Evolutionary Search 326
M. Bhattacharya

Efficient Multicast E-Services over APPCAST 331
V. Radha, V. Gulati, and A. Pujari

Ontology-Based Web Crawler 337
S. Ganesh, M. Jayaraj, V. Kalyan, S. Murthy, and G. Aghila

A Hybrid Number System and Its Application in FPGA-DSP Technology 342
R. Hashemian and B. Sreedharan

Significance of Steganography on Data Security 347
S. Venkatraman, A. Abraham, and M. Paprzycki

Recognition and Identification of Form Document Layouts 352
K. Luo, S. Latifi, K. Taghva, and E. Regentova

Evolutionary Time Scheduling 357
N. Nedjah and L. de Macedo Mourelle

Group Key Management Utilizing Huffman and Petrick Based Approaches 362
S. Ilango and J. Thomas

3D Shape Acquisition Using a Combined SSD and Least Squares Correlation Approach 367
P. Azad, T. Gockel, and R. Dillmann

Mining User Navigational Patterns in Dynamically Changing Environments 372
A. Udechukwu, K. Barker, and R. Alhajj

Session WB II: Wireless Ad Hoc Network

Chairs: Z. Sahinoglu and Philip Orlik

Ant Mobility Model Platform for Network Simulator 380
H.-C. Liao, Y.-W. Ting, S.-H. Yen, and C.-C. Yang

Multiple Directional Antennas in Suburban Ad-Hoc Networks 385
M. Islam, R. Pose, and C. Kopp

Statistic-Based Routing in Wireless Sensor Networks 390
X. Xie and L. Hughes

Collaborative Vision Using Networked Sensors 395
R. Dantu and S. Joglekar

Investigating Peer-to-Peer Systems for Resource Sharing within a Small Group of Nodes 400
L. Neild and R. Pargas

Secure Multipath Communication in Mobile Ad Hoc Networks 405
M. Burmester and T. Le

Accessing SMIL-Based Dynamically Adaptable Multimedia Presentations from Mobile Devices 410
R. Steele, M. Lubonski, Y. Ventsov, and E. Lawrence

Session WB III: Web / Database Applications
Chair: Kazem Taghva

Extended DCEL Data Structure for Mobile Computing 416
J. Li, X. Liang, and L. Gewali

An Object and XML Database Schemas Design Tool 421
N. Chankuang and S. Chittayasothorn

Prefetching XML Data with Abstract Query Mining 428
V. Ng, C. Kong, and S. Wang

Distributed Knowledge Management for Autonomous Access Control in Computer Networks 433
A. Seleznyov and S. Hailes

Software Security in Bangladesh with .NET Framework: A Roadmap 438
M. Alam

Design Strategies to Improve Performance of GIS Web Services 444
S. Tu, M. Flanagin, Y. Wu, M. Abdelguerfi, E. Normund, V. Mahadevan, J. Ratcliff, and K. Shaw

SESSION WB IV: Data Mining II
Chair: Byeong Ho Kang

KIP: A Keyphrase Identification Program with Learning Functions 450
Y.-F. Wu, Q. Li, R. Bot, and X. Chen

Applications of Data Mining in Retail Business 455
S. Ahmed

Integrity Constraints in Temporal Relational Databases 460
A. Tansel

Evidence Combination in Medical Data Mining 465
Y. Aslandogan, G. Mahajani, and S. Taylor

Building Decision Trees Using Functional Dependencies 470
K.-W. Lam and V. Lee

A New Framework for Uncertainty Sampling: Exploiting Uncertain and Positive-Certain Examples in Similarity-Based Text Classification 474
K. Lee and B. Kang

Confidence on Approximate Query in Large Datasets 480
C. Ford, C.-C. Chiang, H. Wu, R. Chilka, and J. Talburt

Session WC I: Cryptographic Hardware I

Chairs: Nadia Nedjah and L. Mourelle

High Performance FPGA Based Elliptic Curve Cryptographic Co-Processor 486
J. Lutz and A. Hasan

A Parallel Architecture for Computing Scalar Multiplication on Hessian Elliptic Curves 493
N. Saqib, F. Rodríguez-Henriquez, and A. Díaz-Pérez

Architectural Design Features of a Programmable High Throughput AES Coprocessor 498
A. Hodjat, P. Schaumont, and I. Verbauwhede

Multi-objective Evolutionary Hardware for RSA-Based Cryptosystems 503
N. Nedjah and L. Mourelle

Efficient Cryptographic Hardware Using the Co-design Methodology 508
L. Mourelle and N. Nedjah

High Performance Arithmetic for Special Hyperelliptic Curve Cryptosystems of Genus Two. 513
J. Pelzl, T. Wollinger, and C. Paar

Fast Modular Multiplication by Operand Changing 518
M. Schimmler and V. Bunimov

A Clock-Less Implementation of the AES Resists to Power and Timing Attacks 525
A. Yu and D. Brée

Increasing Robustness of LSB Audio Steganography Using a Novel Embedding Method 533
N. Cvejic and T. Seppänen

Finding Optimum Parallel Coprocessor Design for Genus 2 Hyperelliptic Curve Cryptosystems 538
G. Bertoni, L. Breveglieri, T. Wollinger, and C. Paar

Session WC II: Cryptographic Hardware II

Chairs: Nadia Nedjah and L. Mourelle

Power-Analysis Attack on an ASIC AES Implementation 546
S. Örs, F. Gürkaynak, E. Oswald, and B. Preneel

A Basis-Independent Algorithm to Design Fast Parallel Multipliers over $GF(2^m)$ 553
M. Elia and M. Leone

On the Importance of Protecting Δ in SFLASH against Side Channel Attacks 560
K. Okeya, T. Takagi, and C. Vuillaume

On Permutation Operations in Cipher Design 569
R. Lee, Z. Shi, Y. Yin, R. Rivest, and M. Robshaw

Streaming Encryption for a Secure Wavelength and Time Domain Hopped Optical Network 578
H. Chan, A. Hodjat, R. Wesel, and I. Verbauwhede

Compact and Efficient Encryption/Decryption Module for FPGA Implementation of the AES Rijndael Very Well Suited for Small Embedded Applications 583
G. Rouvroy, F.-X. Standaert, J.-J. Quisquater, and J.-D. Legat

Area Efficient High Speed Elliptic Curve Cryptoprocessor for Random Curves 588
A. Daneshbeh and M. Hasan

Session WC III: Space Science Computation and IT Applications

Chair: Susan Hoban

Comparing Different Thresholding Algorithms for Segmenting Auroras 594
X. Li, R. Ramachandran, M. He, S. Movva, J. Rushing, S. Graves, W. Lyatsky, A. Tan, and G. Germany

Exploiting Known Latitudinal Variations for Improved Limited-Angle Tomographic Reconstruction of the Plasmasphere 602
N. Santhanam, T. Newman, and D. Gallagher

Mapping Surface Materials on Mars from Mars Pathfinder Spectral Images with HYPEREYE 607
E. Merényi, W. Farrand, and P. Tracadas

Factors Affecting the Signal Quality in Optical Data Transmission and Estimation Method for BER and SNR 615
S. Kartalopoulos

Lossless Encoding Based on Redistribution of Statistics 620
A. Grigoryan, S. Dursun, and E. Regentova

On the Design of Heterogeneous Applications for Distributed Coordination 625
C.-C. Chiang and P. Tang

SESSION WC IV: Potpourri II

Chair: Roy Pargas

Digital Library Resources Description 632
C. Moghrabi, T.-H. Le, J. Roy, and J. Hachey

Applying Continuous Action Reinforcement Learning Automata (CARLA) to Global Training of Hidden Markov Models 638
J. Kabudian, M. Meybodi, and M. Homayounpour

Wearable, Wireless Brain Computer Interfaces in Augmented Reality Environments 643
K. Navarro

Towards Proactive Computer-System Forensics 648
P. Bradford, M. Brown, J. Perdue, and B. Self

A Novel Approach for Bi-directional Motion Estimation and Compensation 653
F. Ahmadianpour and M. Ahmad

Fuzzy Clustering for TV Program Classification 658
Y. Zhiwen, Z. Xingshe, G. Jianhua, and Y. Zhiyi

Session WD I: IMAGE / VIDEO Processing

Chair: Legand Burge

Improved Rate Control for Advanced Video Coding (AVC) Standard under Low Delay Constraint 664
P. Navakitkanok and S. Aramvith

Distributed Omni-video Arrays and Digital Tele-viewer for Customized Viewing, Event Detection and Notification 669
M. Trivedi, K. Huang, T. Gandhi, B. Hall, and K. Harlow

Application of Active Contour Models in Medical Image Segmentation 675
F. Derraz, M. Beladgham, and M. Khelif

Digital Analysis of Thermal Infrared Imagery Using Temperature Mapping 682
C. Venkateswarlu, S. Yenduri, and S. Iyengar

An HVS-Based Motion Vector Composition Algorithm for Spatial Resolution Transcoding 689
A. Yusuf, M. Murshed, and L. Dooley

Neural Image Recognition System with Application to Tuberculosis Detection 694
K. Ramana and S. Basha

Error Concealment of Transform Coded Images with Continuous QoS 699
X. Su and Y. Shang

JPEG Compression Immune Steganography Using Wavelet Transform 704
J. Xu, A. Sung, P. Shi, and Q. Liu

A Novel DCT-Based Approach for Secure Color Image Watermarking 709
N. Ahmidi and R. Safabakhsh

Efficient Technique for Ellipse Detection Using Restricted Randomized Hough Transform 714
Z. Cheng and Y. Liu

Session WD II: Mobile Enterprise II

Chair: Robert Steele

Key Agreement and Identity Authentication Protocols for Ad Hoc Network 720
J. Yao and G. Zeng

Hybrid Greedy/Multicasting Power-Aware Routing Protocol in Ad Hoc Networks 725
J. Li and D. Cordes

NICD: A Novel Indexless Wireless On-Demand Data Broadcast Algorithm 730
O. Ramanaiah and H. Mohanty

Causal Ordering in Event Notification Service Systems for Mobile Users 735
C. Lwin, H. Mohanty, and R. Ghosh

Using SPIN to Model Cryptographic Protocols 741
L. Yongjian and X. Rui

Bluetooth Potential in the M-Enterprise: A Feasibility Study 746
S. Pradhan, E. Lawrence, S. Newton, and J. Das

Security Level Evaluation: Policy and Fuzzy Techniques 752
V. Casola, M. Rak, R. Preziosi, and L. Troiano

Session WD III: E Gaming

Chair: Josep Domingo-Ferrer

Secure Large-Scale Bingo 758
A. Martínez-Ballesté, F. Sebé, and J. Domingo-Ferrer

Efficient Recovery of Secrets 763
M. Fernandez and M. Soriano

A Platform for Secure E-Gambling 768
C. Blundo and S. Cimato

A Game-Theoretic Model for Two-Party Cryptographic Protocols 773
P. Caballero-Gil, C. Hernández-Goya, and C. Bruno-Castañeda

A Non-repudiable Bitstring Commitment Scheme Based on a Public-Key Cryptosystem 778
J. Castellà-Roca and J. Domingo Ferrer

On the Security of an Efficient TTP-Free Mental Poker Protocol 781
J. Castellà-Roca and J. Domingo-Ferrer

SESSION WD IV: Applications

Chair: Henry Selveraj

An Approach to On-Line Text Generation for E-Learning Purposes 786
M. Mahmoudi and K. Badie

Analysis and Compensation of Errors in the Input Device Based on Inertial Sensors 790
J. Yang, W. Chang, W.-C. Bang, E.-S. Choi, K.-H. Kang, S.-J. Cho, and D.-Y. Kim

Evaluation and Comparison of Natural Language and Graphical User Interfaces in "Query-by-Impressions" Scenes 797
T. Kumamoto and K. Ohta

Estimation of Camera Pose Using 2D to 3D Corner Correspondence 805
F. Shi and Y. Liu

Secure Information Sharing Using Role-Based Delegation 810
G.-J. Ahn and B. Mohan

Baghdad Method for Calculating Multiplicative Inverse 816
S. Aboud

An Information Search Interface with Soft Real-Time Guarantee 820
W. Huayong and D. Yiqi

SESSION WD V: New Session

Synthesis Scheme for Low Power Designs with Multiple Supply Voltages by Heuristic Algorithms 826
L. Wang, Y. Jiang, and H. Selvaraj

Knowledge Discovery in a Microarray Data Warehouse 831
A. Al-Timimi and D. Jamison

Three and Four-Dimensional Parity-Check Codes for Correction and Detection of Multiple Errors 837
N. Anne, U. Thirunavukkarasu, and S. Latifi

An Efficient Reconfigurable Architecture and Implementation of Edge Detection Algorithm Using Handle-C 843
D. Rao and M. Venkatesan

Author Index 849

Accessing SMIL-based Dynamically Adaptable Multimedia Presentations from Mobile Devices

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Abstract

Current business presentations are commonly multimedia-based and with the realization of the mobile enterprise, accessing of such presentations stored on servers from mobile devices will become increasingly common. However as a roaming mobile device user moves, factors that change include the local wireless network technology, the available bandwidth, the currently closest source of the media files and even the continuity of wireless access. The XML-based standard, Synchronized Multimedia Integration Language (SMIL), provides a format to specify the display sequence and layout of media files in a multimedia presentation. In this paper we present a SMIL-based system for mobile devices that is able to dynamically adapt presentations in response to such changing mobile computing-related factors as those given above.

1. Introduction

As a mobile device user moves a number of factors change that can affect their access to a multimedia presentation. Firstly, the server that is currently the closest or fastest from which to access a multimedia file from may change. As such, ideally, in order to improve network performance a mobile device should change its access source during a presentation to choose the most efficient multimedia source.

Secondly, the speed of wireless access may change. For example a device may pass from a Wi-Fi [11] or Bluetooth [1] area into an area with just GPRS [6] access. As bandwidth changes the same sized multimedia files may not be able to be delivered to the mobile device. Thirdly, a mobile device may pass out of wireless communication completely so it will need to adapt to this scenario also. A final problem is that a complete multimedia presentation may be too large to store in its entirety on a mobile device and hence will need to be downloaded and viewed incrementally.

2. Background

Synchronized Multimedia Integration Language (SMIL) (pronounced smile) [3] is an XML-based [2, 4, 9] standard. XML provides a customizable format for specifying meta-information about data. Its textual nature makes it human readable and also easy to process and manipulate. XML is also well-suited to communication in mobile computing systems [10] due to the high heterogeneity of such systems and the platform independence of XML.

SMIL can be used to provide meta-information about multimedia presentations (see Figure 1). It can be employed by Web site creators to specify how multimedia elements (video, sound, still images) can be presented and played in sequence/ parallel as part of a Web presentation. Table 1 lists the advantages implied by various SMIL features. Because SMIL allows for the sending of multiple movies, still images, and sound separately in a coordinated fashion the researchers believe its flexibility is well suited to the dynamic aspects of mobile computing. Each media object is accessed with a unique Uniform Resource Locator (URL), which means each can be retrieved from a different source and different sources can be used as time moves forward.

The methodology used in this research considers two alternatives for delivering a multimedia presentation to a mobile device: as a monolithic multimedia file or as a SMIL-based presentation. We identify the assumed mobile computing architecture (combination of e.g. WiFi and GPRS connectivity), identify aspects of this architecture that effect the access of multimedia presentations from mobile devices and devise new techniques that make use of SMIL to improve such access to multimedia presentations. We consider how these new techniques compare with a monolithic multimedia file-based approach.

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Table 1: Key features of SMIL [8]

Feature	Advantage
Multiple version storage	Allows for each version to have a different bandwidth for a variety of users. Allows individual components of a presentation to be choreographed across a timeline in relation to each other. Allows for control of the layout, appearance, and exit time of each file.
Multiple language versions	Useful for global users – more versions of soundtracks
Extra track (layer of content within single audio and video file)	Allows for closed captioning for people with hearing impairments. [5]
Simple, vendor-neutral markup language	Easy to learn - uses three XML elements that may be written in a simple text editor [2]
It does not work well with non-linear presentations	Useful for slideshow-style mixed media presentations
Easy to create low-bandwidth, TV-like content on the Web	Because the media files exist outside of the SMIL file, they retain their individual file sizes. No file-size expansion to slow download times.[8]
Different from other multimedia presentation tools as, instead of forcing each component into a single video file, the text-based SMIL file merely references each file by its URL	To change an audio component within a complex after a presentation begins, simply edit the SMIL file. Not necessary to rebuild the entire presentation from scratch.

```
<smil>
 <head>
 <meta name="copyright" content="sample" />
 <layout>
   <!-- layout tags -->
   <root-layout width="600" height="300" background-color="white" />
 </layout>
 </head>
 <body>
   <!-- media and synchronization tags -->
  <par>
   <audio src="voice.wav" clip-begin="7s" alt="speaker voice" dur="360s" />
   <seq>
    <img src="title.gif" alt="The presentation title" dur="6s"/>
    <video src="slides.mpg" clip-begin="7s" alt="slides" dur="360s" />
   </seq>
  </par>
 </body>
</smil>
```

Figure 1: Example SMIL file

3. A SMIL-based System for Dynamically Adaptable Multimedia Presentations

3.1 System Architecture

The mobile computing architecture assumed for the proposed system for dynamically adaptable multimedia presentations (see Figure 2):

- A central server that is continually accessible from mobile devices via GPRS and which acts as a resource lookup server
- Many WiFi local access points scattered at various possibly non-adjacent locations
- At each access point there is an associated server that has a high-speed Internet connection. These servers act as proxy Web servers.
- Multiple servers storing multimedia files. Certain multimedia files may be duplicated at many servers.
- WiFi and GPRS-enabled mobile devices each with a device-based agent carried by roaming users

3.2. Accessing SMIL-based Dynamically Adaptable Multimedia Presentations

In the proposed system an XML SMIL file specifies what multimedia files must be accessed in a multimedia presentation including how and where they are to be displayed in the presentation window. SMIL does not embed all of the multimedia files in one monolithic file for the presentation but rather just provides references (URLs) for the multimedia files and these can be downloaded separately from these specified URLs.

Each mobile device will have an agent [7] that will manage the retrieval and display of the SMIL-based multimedia presentation. An agent dynamically manages aspects of multimedia resource retrieval such as what files to retrieve and when by following the statements of the SMIL file but also making some decisions based on its knowledge of the current state of the mobile device and wireless connection.

As a mobile device passes through a WiFi access area and requests a multimedia presentation the XML SMIL file representing this presentation will be sent to the mobile device. The agent will identify the first multimedia file(s) to be displayed and make a request to their URLs (see Figure 3). This request will be routed through the local access point server which will act as a proxy Web server (Step 1). This proxy server will then make a request to the central server (the resource lookup server in particular) (Step 2). This lookup server will know the location of the closest copy of the requested multimedia file and will return the URL of this copy to the proxy Web server (Step 4). The proxy Web server will then request this file from the URL indicated by the central lookup server. The proxy server will then return

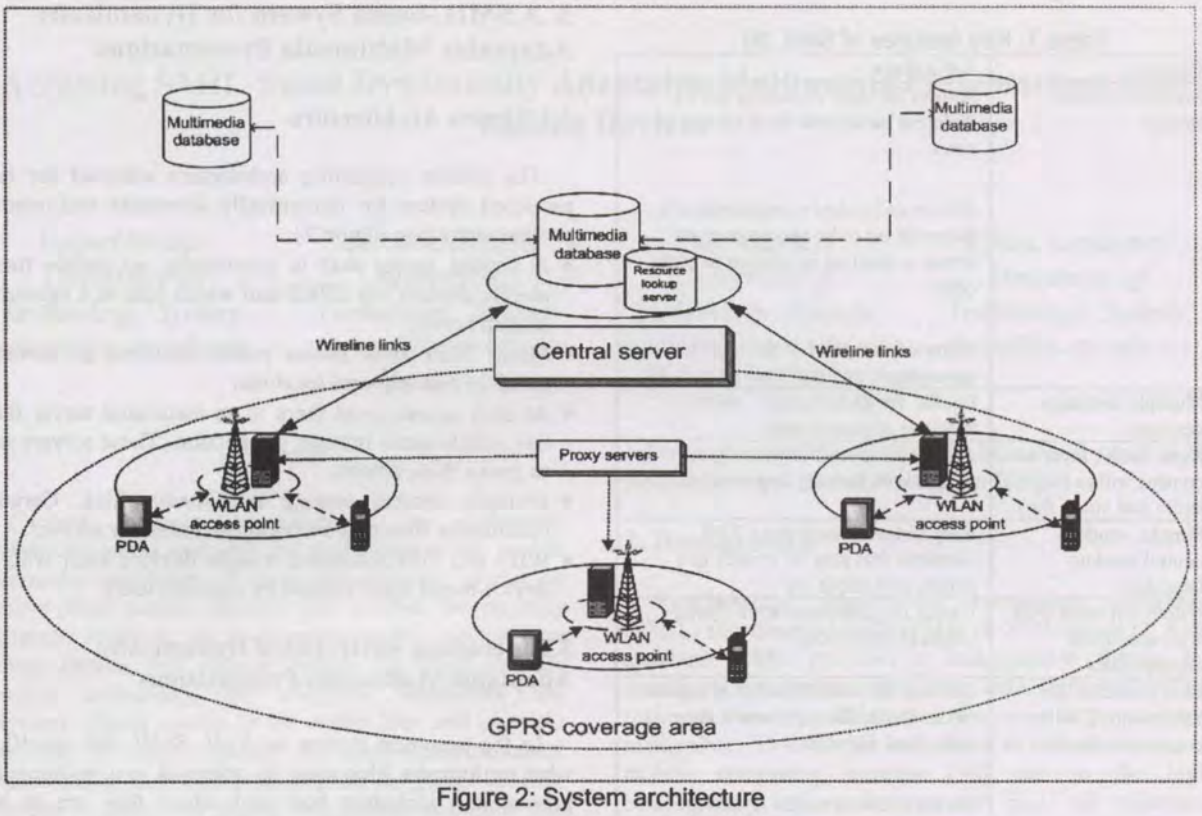


Figure 2: System architecture

this multimedia file to the requesting mobile device (Steps 5 and 6). Figure 4 shows how this corresponds to the contents of a SMIL presentation file.

Via the use of a proxy and lookup server, the file will be retrieved from the closest/ fastest source for the multimedia file. The importance of providing the best source of the presentation elements has several aspects.

Given that multimedia files can be quite large, accessing the file from the most efficient server is important. Redirecting user requests to the optimal source for each particular multimedia file improves not only the user's experience but the performance of the system as a whole. Accessing the source for which there is the "best" network link decreases possible transmission disturbance and as a result, improves the presentation quality. In addition, the central lookup server can serve source suggestions based on its global knowledge and thereby improve the whole-of-system performance.

As a mobile device moves the sequence of definitions of multimedia resources in the SMIL file dictates what new multimedia files will be requested. The requests are performed by the device-based agent which contacts the proxy server to request the file from the most appropriate server – this server may differ from the server previously used.

As a mobile device passes out of a WiFi access area the device-based agent will detect this. For example the device may now pass into a GPRS access area. This situation of lower bandwidth connectivity can be accommodated for by (1) multimedia presentation providers or (2) automatically adapted to by the system.

In the first case the presentation provider during construction of the SMIL file can prepare the presentation in such a way that its elements are decomposed into smaller parts referenced separately in the presentation description. By doing this, the chance that the download of a particular file will be interrupted mid-stream by a change in connectivity is decreased.

In addition the presentation provider can provide different alternative multimedia files that will be used depending on the current network connectivity at the mobile device's location e.g. Wi-Fi, GPRS. In practice this could be achieved using the SMIL <switch> tag. The switch tag allows differing tags to be evaluated depending on Boolean conditions. In the case of GPRS-only access, a smaller/ lower fidelity file can be the alternative or, for example, a sequence of gif images could be provided instead of a movie (e.g. mpg) file.

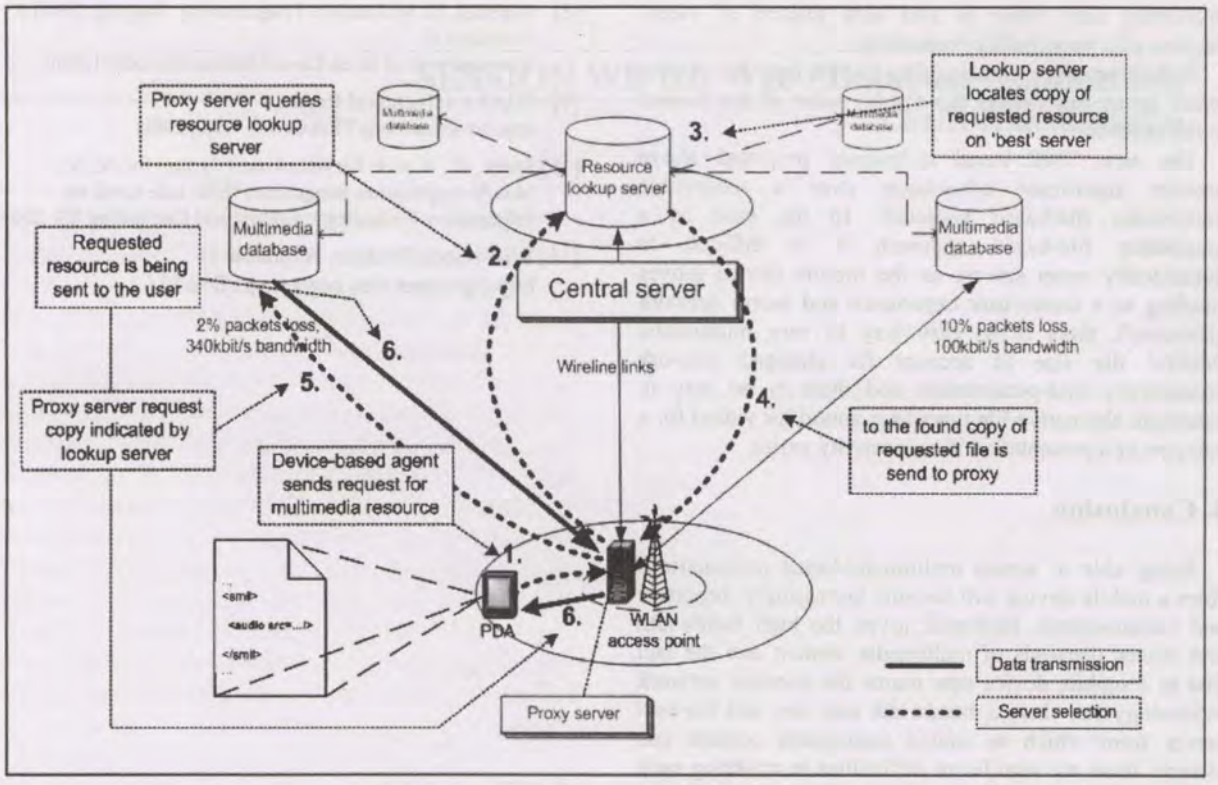


Figure 3: Server selection procedure

```
<smil>
 <head>
  <layout>
   <root-layout width="300" height="200" background-color="white" />
   <region id="footnote" left="50" top="175" width="150" height="25" />
   <region id="slides" left="25" top="25" width="250" height="170" />
  </layout>
 </head>

 <body>
  <switch>

   <!-- fully functional presentation when user is in WLAN coverage area -->
   <par system-bitrate="300000">
    <seq>
     <video src="http://www.focomedia.com.au/slides_300k.mpg" alt="slides" dur="3600s"
        region="slides" />
    </seq>
    <seq>
     <video src="http://www.focomedia.com.au/examples_300k.mpg" alt="examples" dur="360s"
        region="slides" />
    </seq>
   </par>

   <!-- only voice when user uses GPRS connection-->
   <par system-bitrate="100000">
    <audio src="http://www.focomedia.com.au/lecturer_56k.wav" alt="voice" dur="3960s" />
   </par>
  </switch>
  <par>
   <text src="footnote.txt" region="footnote" />
  </par>
 </body>
</smil>
```

E.g.: lookup server maps the requested resource to this URL:
http://node1.multimedia-database.au/slides_300k.mpg

E.g.: lookup server maps the requested resource to this URL:
http://node5.multimedia-database.au/examples_300k.mpg

E.g.: lookup server maps the requested resource to this URL:
http://node1.multimedia-database.au/lecturer_56k.wav

Figure 4: Example SMIL document

In the second case where the presentation provider has made no alternative multimedia file options the device-based agent can make dynamic changes to the SMIL file itself. It can request the specified file from the central server (via GPRS) providing an option that indicates that an alternative file is sought. In this case the central server's knowledge of alternative files is used. It can be aware of these alternatives to the current file by examining its history of alternatives that were previously used for this file, possibly in other multimedia presentations.

Alternative instances of the same multimedia element can be used when requesting devices are in the presence of differing network connectivity but it can also be used for providing additional system reliability when there is a (sudden) decrease of bandwidth in the network link to the multimedia database or network congestion.

The alternative files for multimedia such as voice or video could be encoded with lower bit rate. Even though this alternative would mean lower quality it will preserve continuity of presentation which in most cases is the preferred option.

The ability to access the same multimedia file but with different quality can be extended by substitution of the initially requested resource with different file type but presenting the same element of the presentation. Such substitution can be useful when the mobile device is not able to present the initially selected resource e.g.

presenting only voice or text data instead of video, because of a poor quality connection.

If there are no alternative files known then the device-based agent can extend the display time of the current multimedia file.

The new SMIL-based techniques proposed above provide significant advantages over a monolithic multimedia file-based approach. In the case of a monolithic file-based approach it is difficult to dynamically swap servers as the mobile device moves (leading to a worse user experience and worse network efficiency), there is no easy way to vary multimedia fidelity/ file size to account for changed network connectivity mid-presentation and there is no way to substitute alternative file types (e.g. sound for video) for a sub-part of a presentation if connectivity varies.

4. Conclusion

Being able to access multimedia-based presentations from a mobile device will become increasingly important and commonplace. However, given the high bandwidth and device demands of multimedia content and the fact that as a mobile device user roams the wireless network technology can change, bandwidth can vary and the best server from which to source multimedia content can change, there are significant difficulties in enabling such mobile device access of multimedia presentations. In this paper we have proposed a system that makes use of the SMIL standard to dynamically adapt how a presentation is composed and its constituent files retrieved so as to cope with the difficulties mentioned above.

6. References

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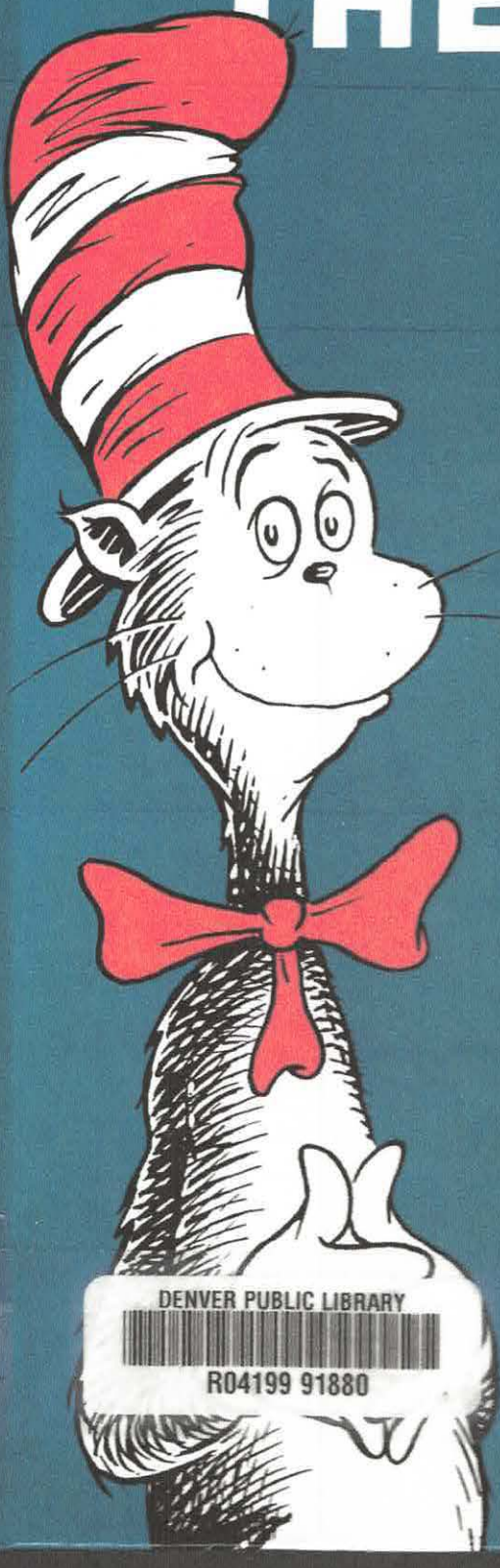
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[10] Steele, R., A Web Services-based System for Ad-hoc Mobile Application Integration, IEEE Intl. Conf. on Information Technology: Coding and Computing '03, 2003.

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ATTACHMENT 8

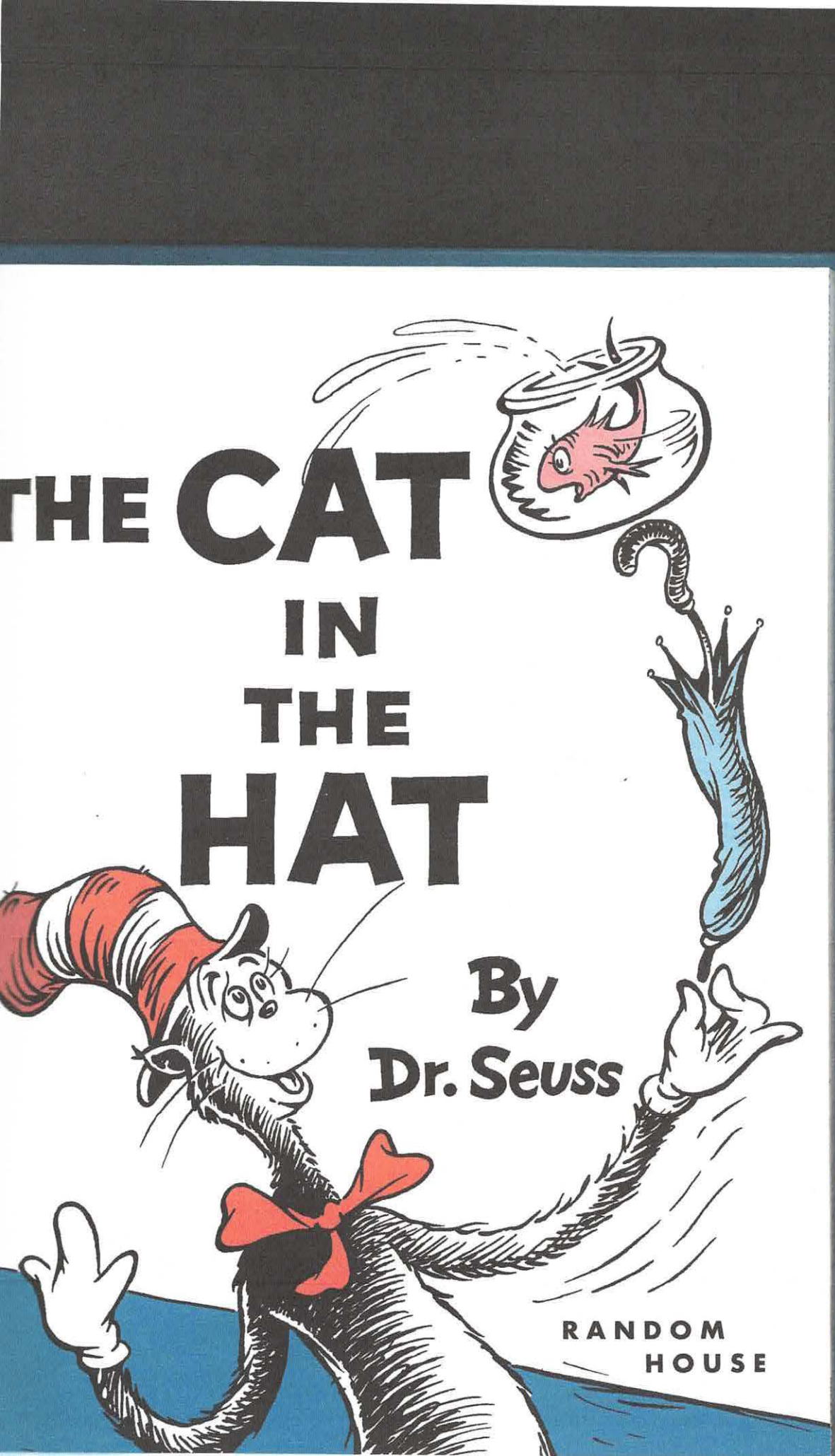
THE CAT IN THE HAT



I CAN READ IT ALL BY MYSELF
Beginner Books

By Dr. Seuss

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THE CAT IN THE HAT
By Dr. Seuss
RANDOM HOUSE

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ISBN 978-0-385-37201-5 (ebook)

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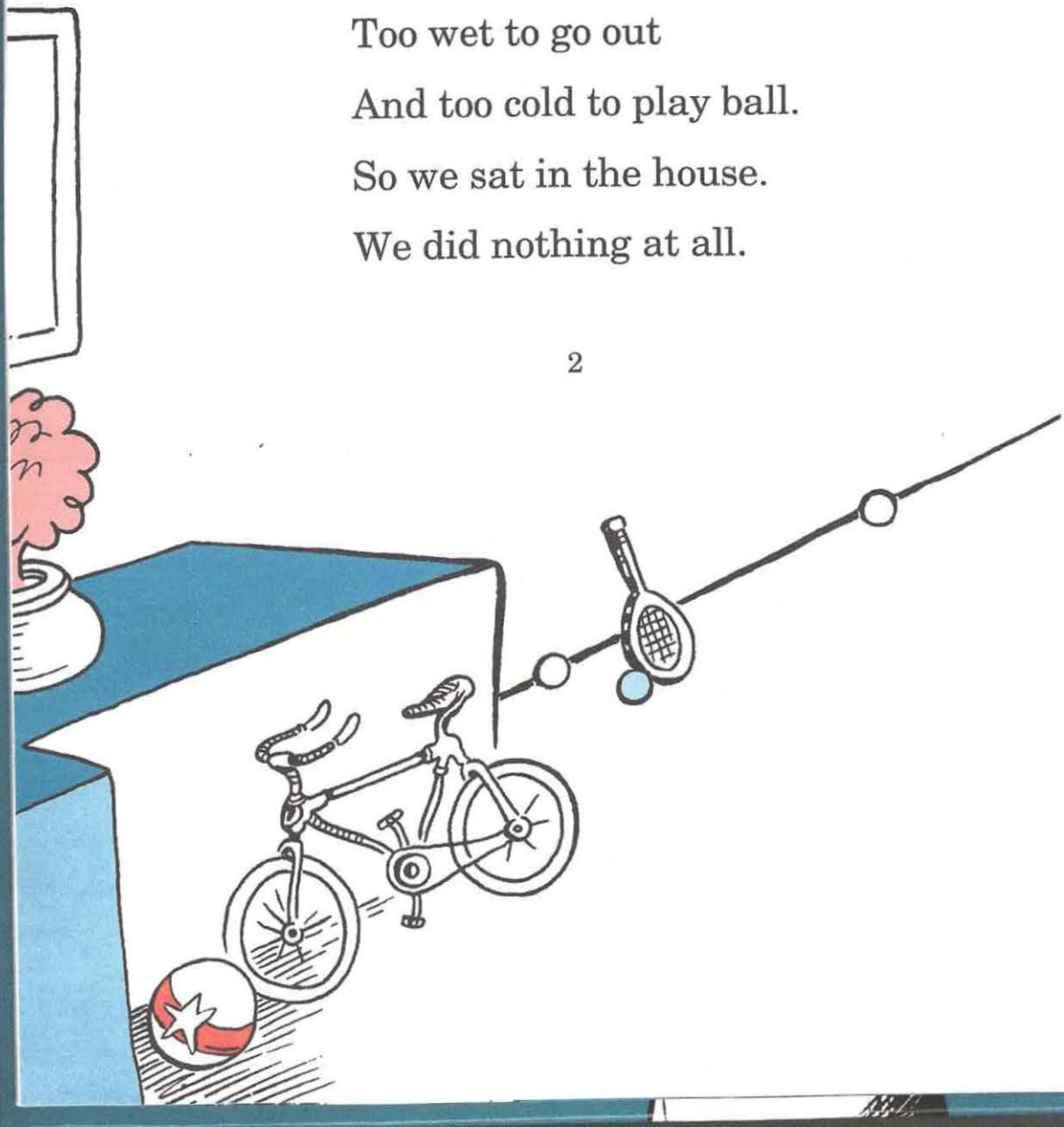
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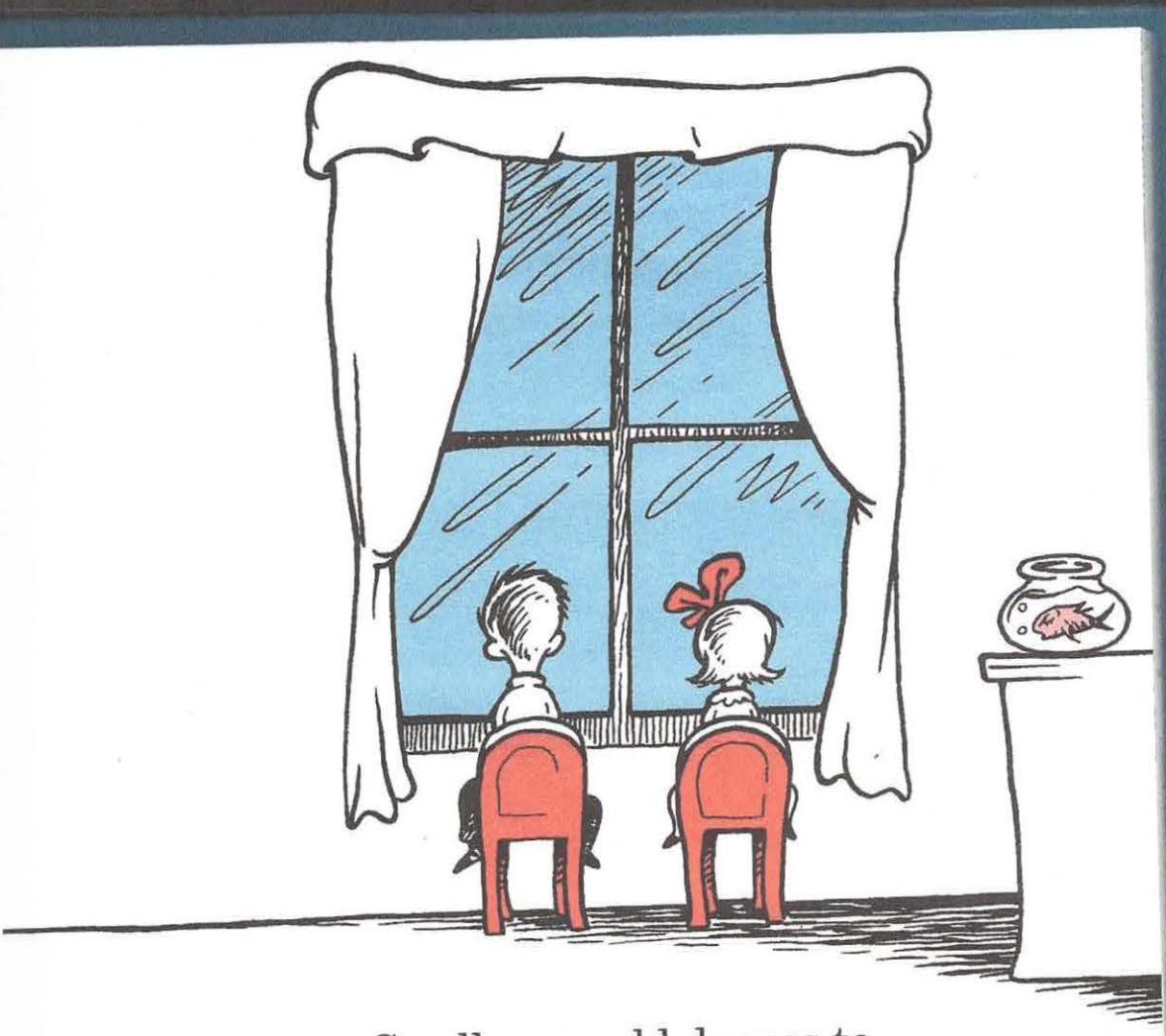


The sun did not shine.
It was too wet to play.
So we sat in the house
All that cold, cold, wet day.

I sat there with Sally.
We sat there, we two.
And I said, "How I wish
We had something to do!"

Too wet to go out
And too cold to play ball.
So we sat in the house.
We did nothing at all.





So all we could do was to

Sit!

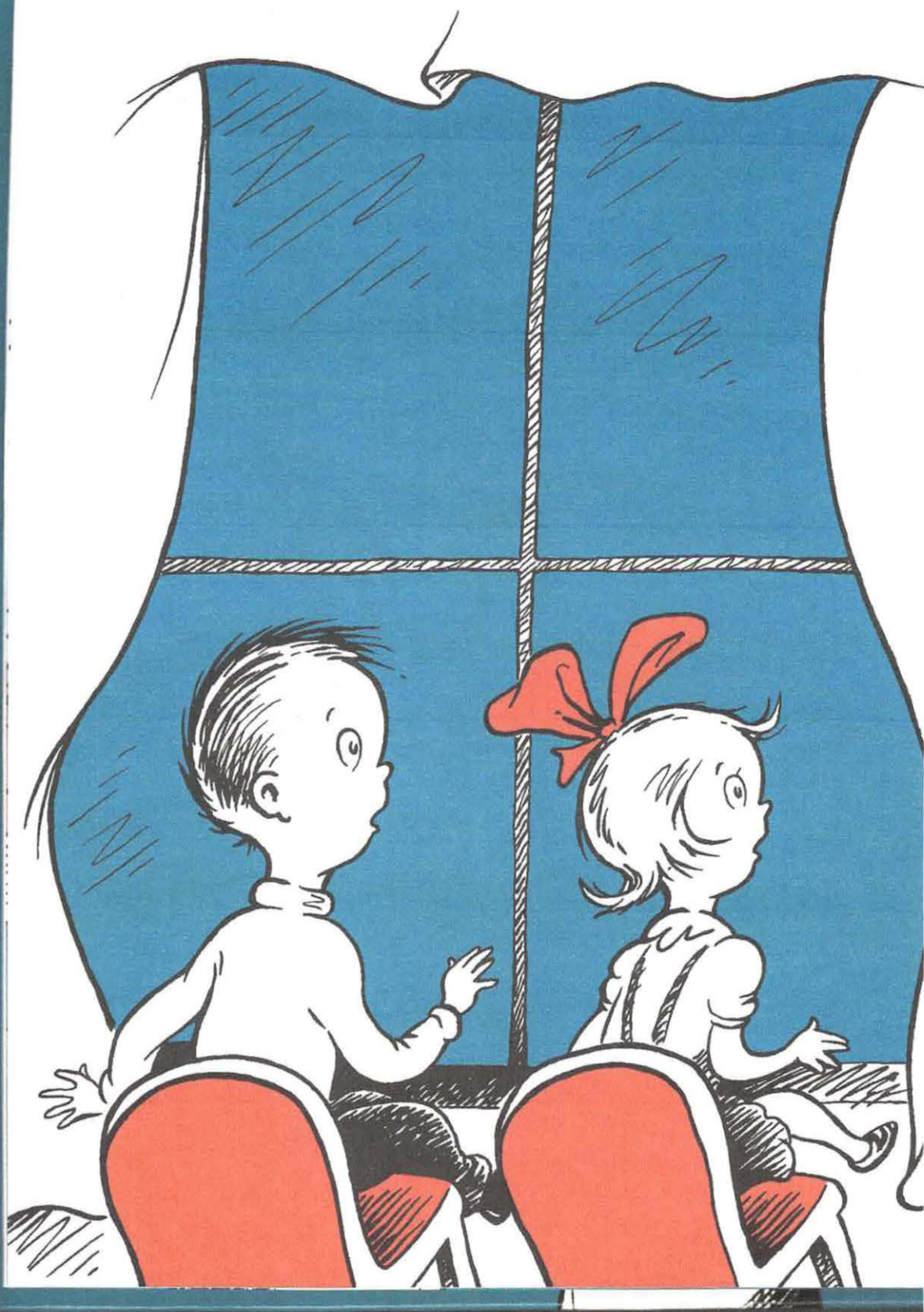
Sit!

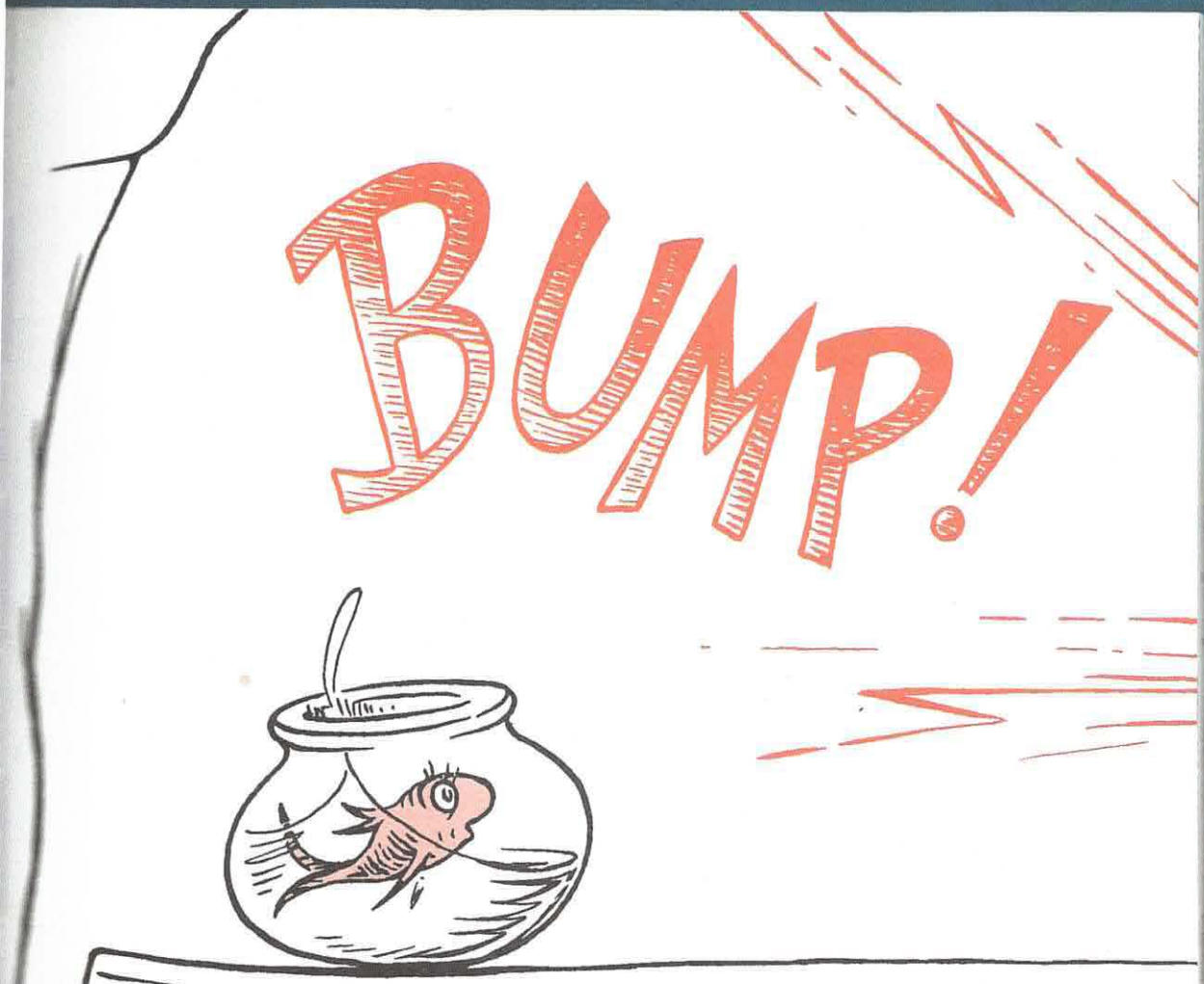
Sit!

Sit!

And we did not like it.

Not one little bit.





And then

Something went BUMP!

How that bump made us jump!



We looked!

Then we saw him step in on the mat!

We looked!

And we saw him!

The Cat in the Hat!

And he said to us,

"Why do you sit there like that?"



"I know it is wet

And the sun is not sunny.

But we can have

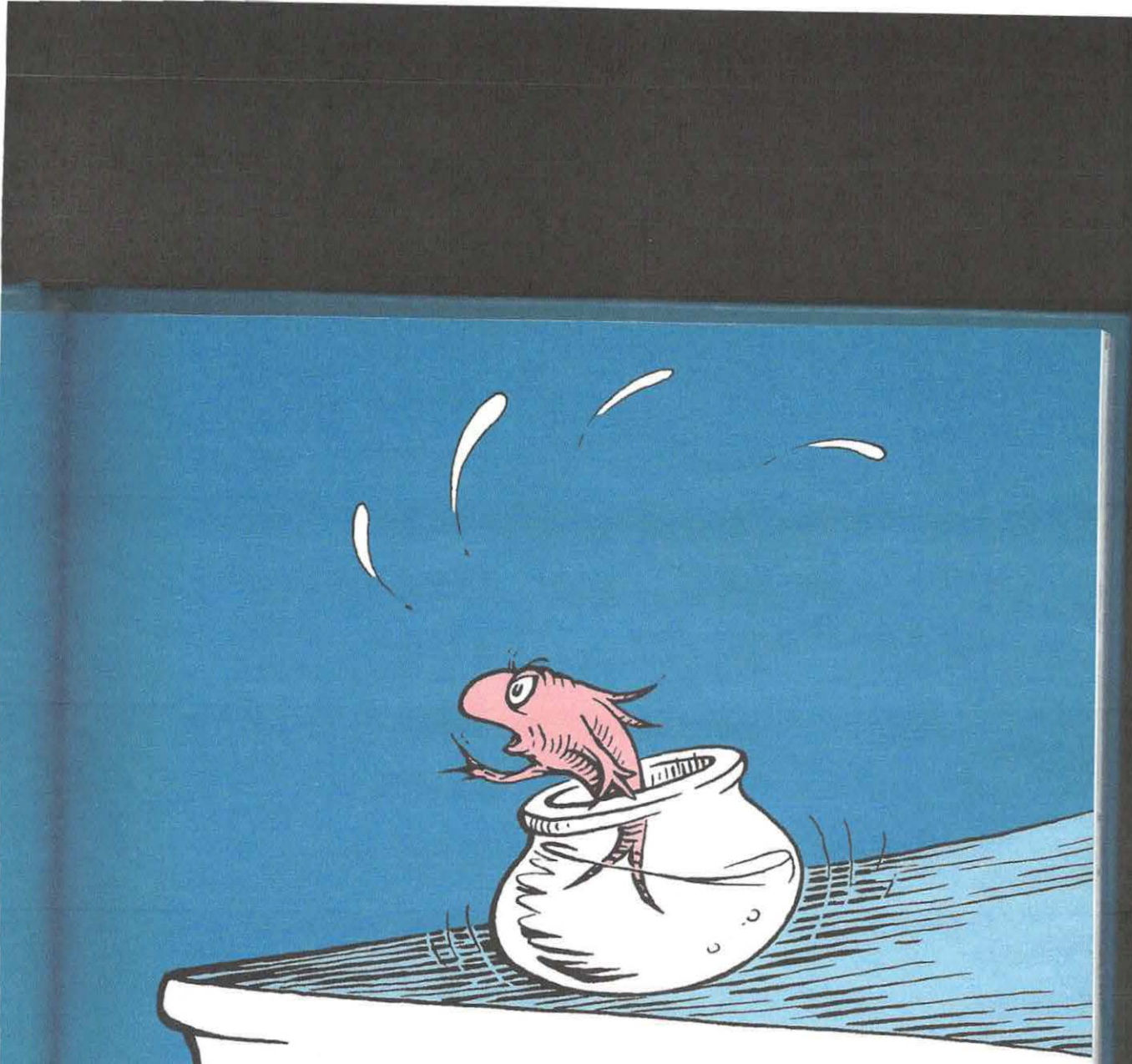
Lots of good fun that is funny!"

"I know some good games we could play,"
Said the cat.
"I know some new tricks,"
Said the Cat in the Hat.
"A lot of good tricks.
I will show them to you.
Your mother
Will not mind at all if I do."



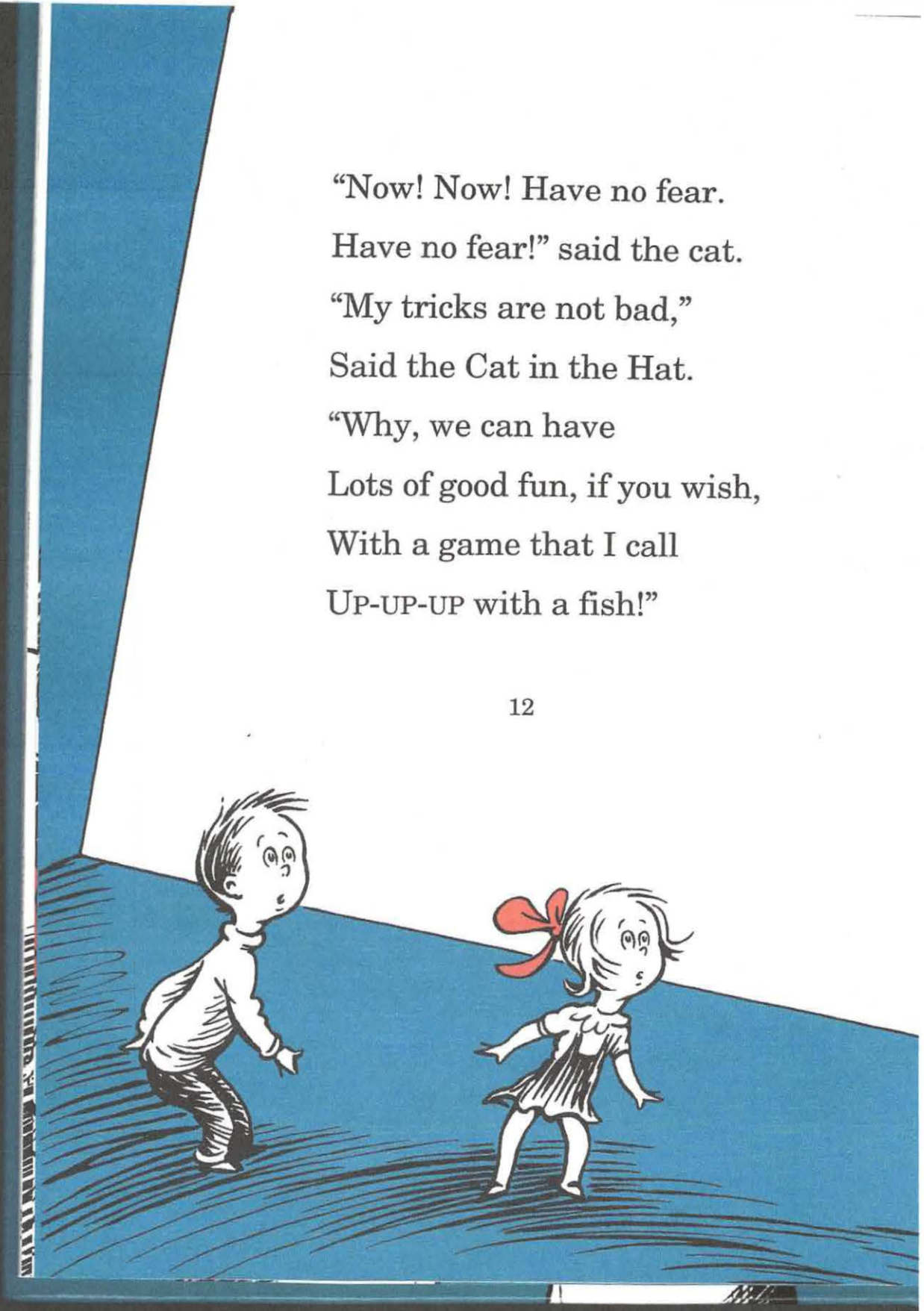
Then Sally and I
Did not know what to say.
Our mother was out of the house
For the day.

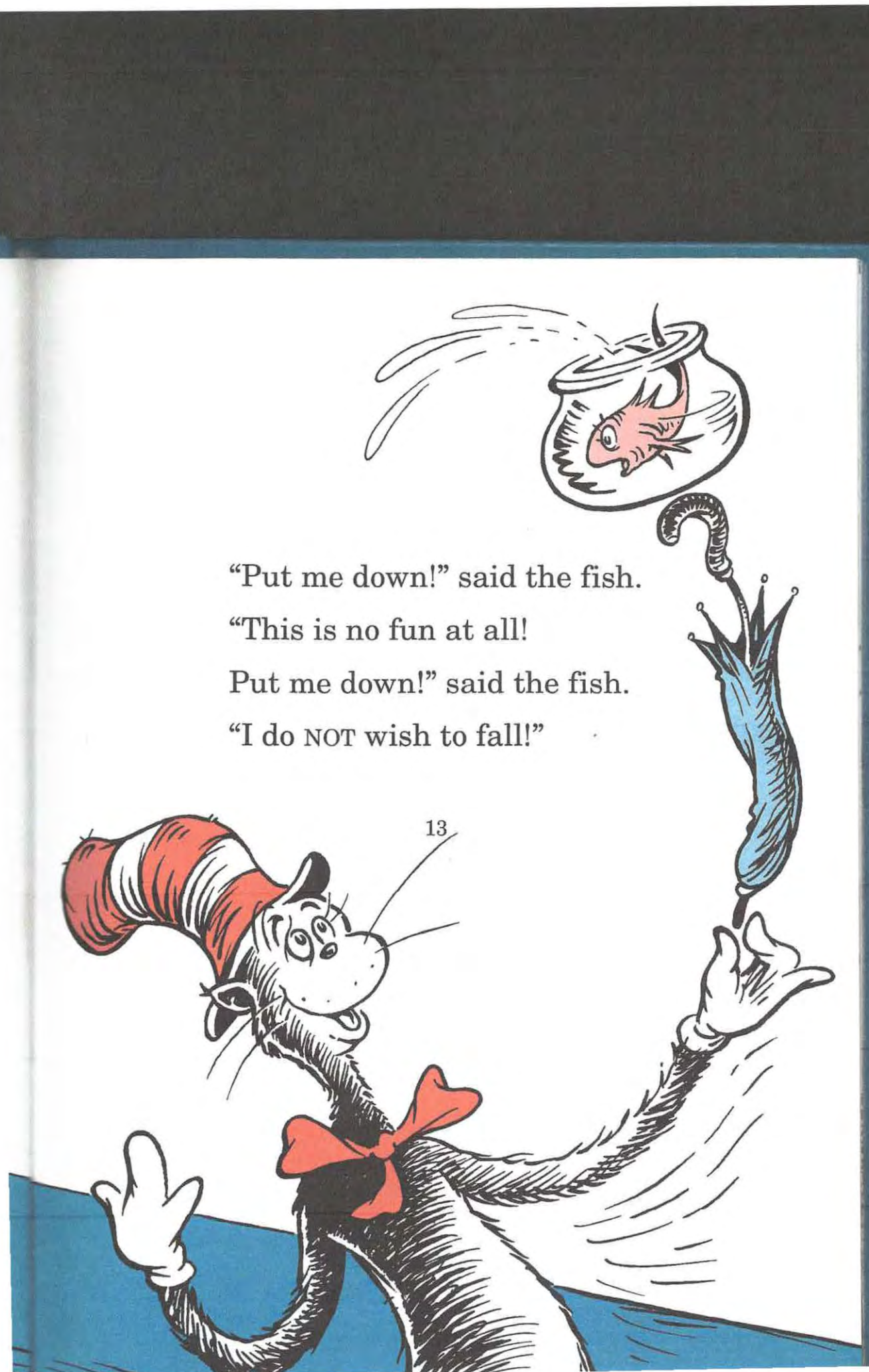




But our fish said, "No! No!
Make that cat go away!
Tell that Cat in the Hat
You do NOT want to play.
He should not be here.
He should not be about.
He should not be here
When your mother is out!"

"Now! Now! Have no fear.
Have no fear!" said the cat.
"My tricks are not bad,"
Said the Cat in the Hat.
"Why, we can have
Lots of good fun, if you wish,
With a game that I call
UP-UP-UP with a fish!"

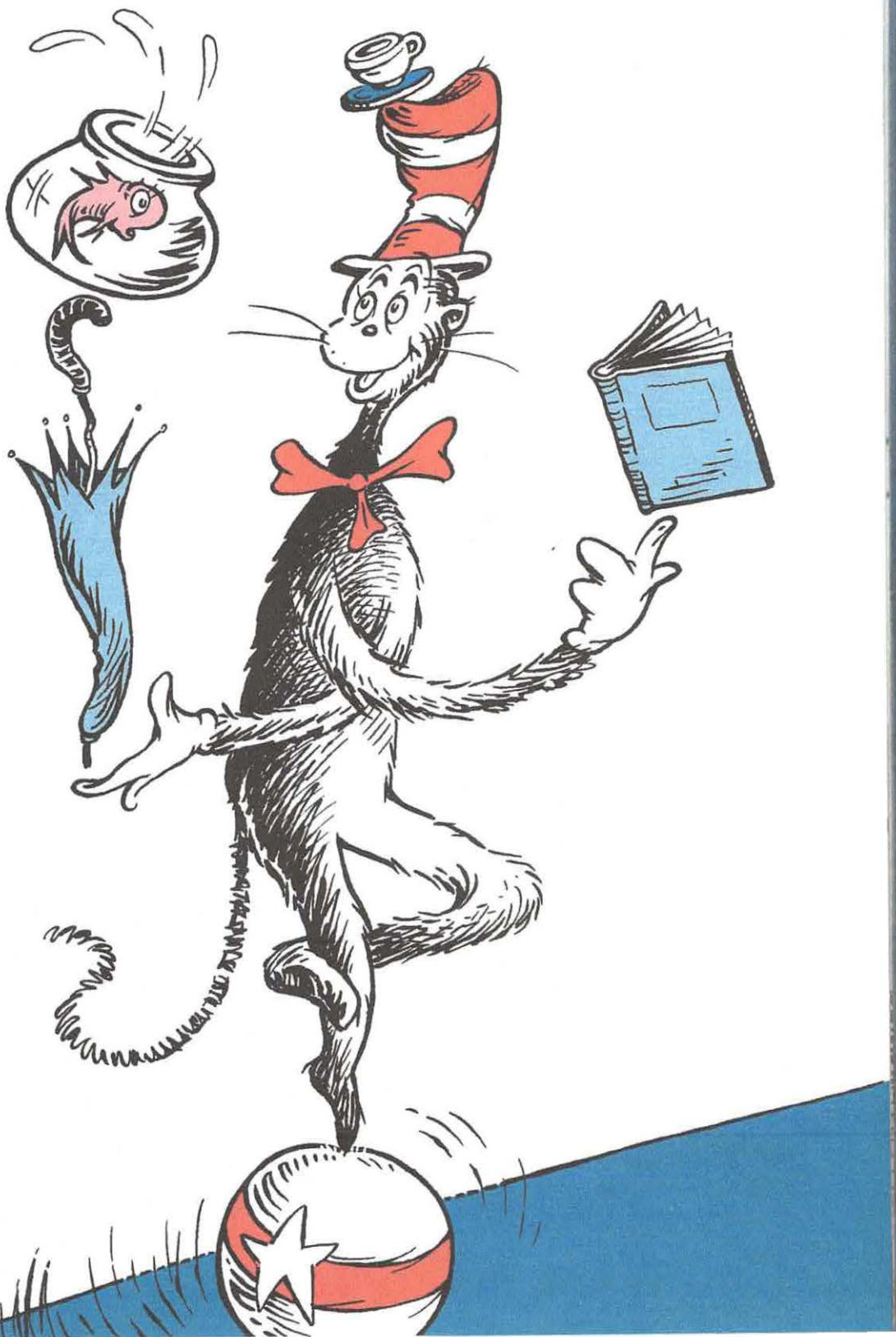




"Put me down!" said the fish.
"This is no fun at all!
Put me down!" said the fish.
"I do NOT wish to fall!"

"Have no fear!" said the cat.
"I will not let you fall.
I will hold you up high
As I stand on a ball.
With a book on one hand!
And a cup on my hat!
But that is not ALL I can do!"
Said the cat . . .





"Look at me!

Look at me now!" said the cat.

"With a cup and a cake

On the top of my hat!

I can hold up TWO books!

I can hold up the fish!

And a little toy ship!

And some milk on a dish!

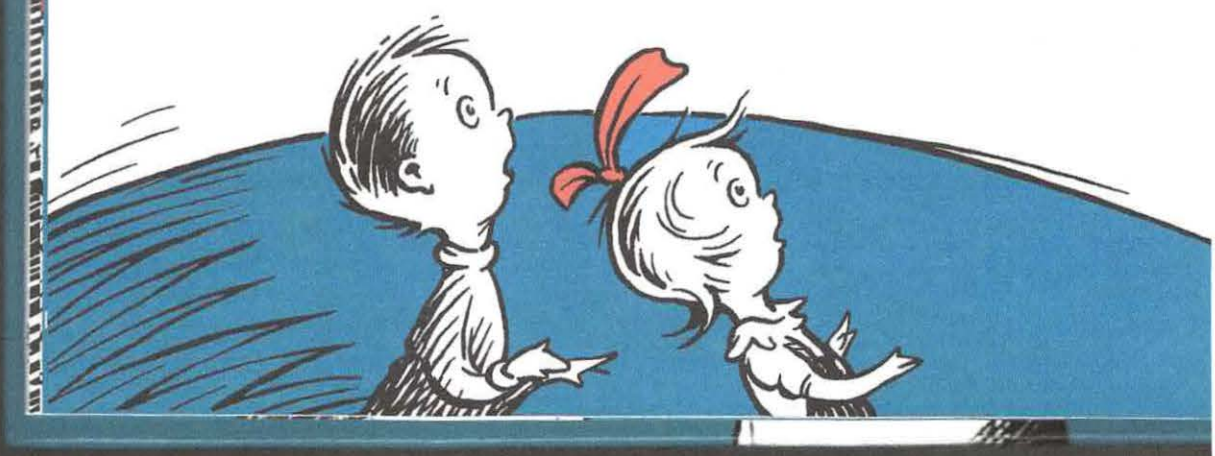
And look!

I can hop up and down on the ball!

But that is not all!

Oh, no.

That is not all . . .

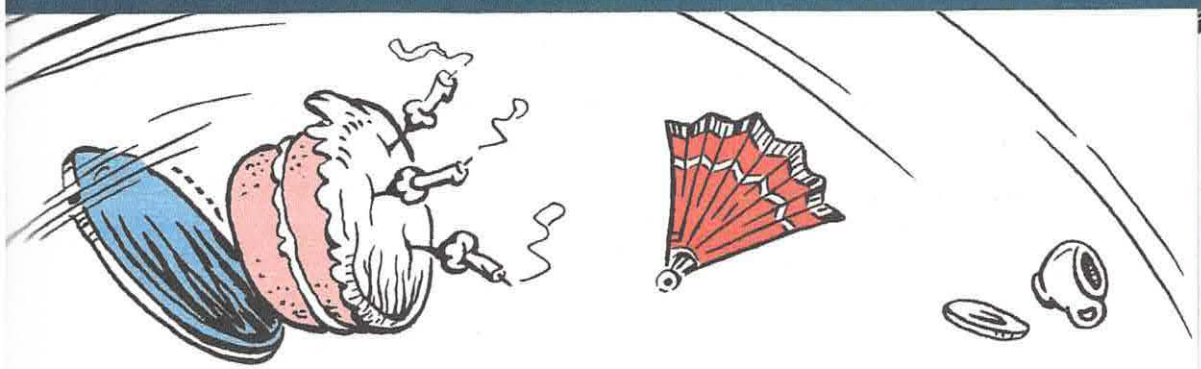




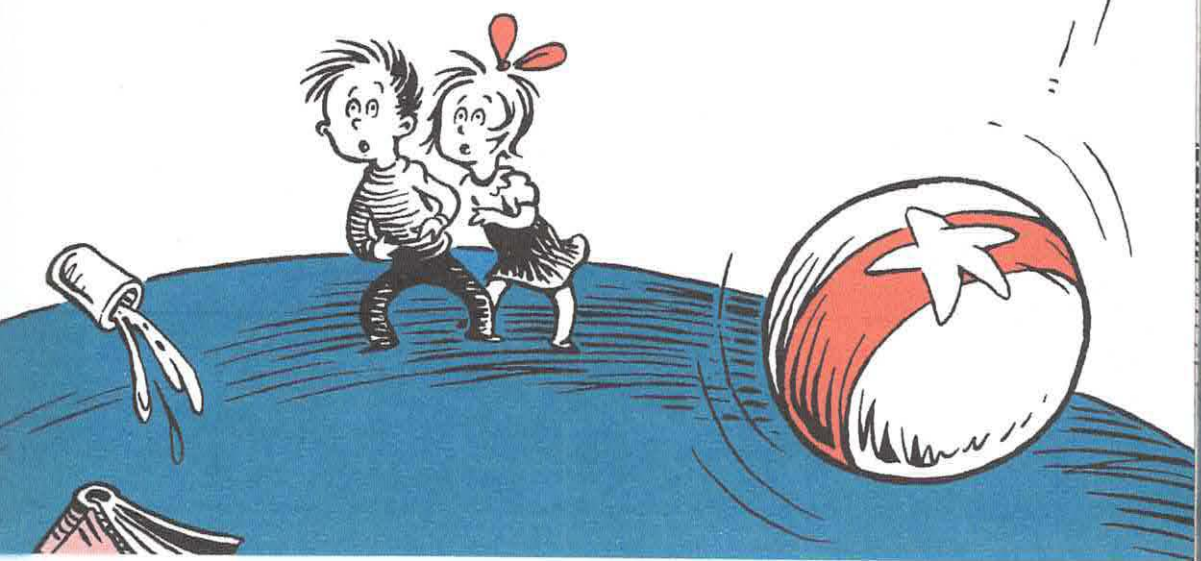
"Look at me!
Look at me!
Look at me NOW!
It is fun to have fun
But you have to know how.
I can hold up the cup
And the milk and the cake!
I can hold up these books!
And the fish on a rake!
I can hold the toy ship
And a little toy man!
And look! With my tail
I can hold a red fan!
I can fan with the fan
As I hop on the ball!
But that is not all.
Oh, no.
That is not all. . . ."

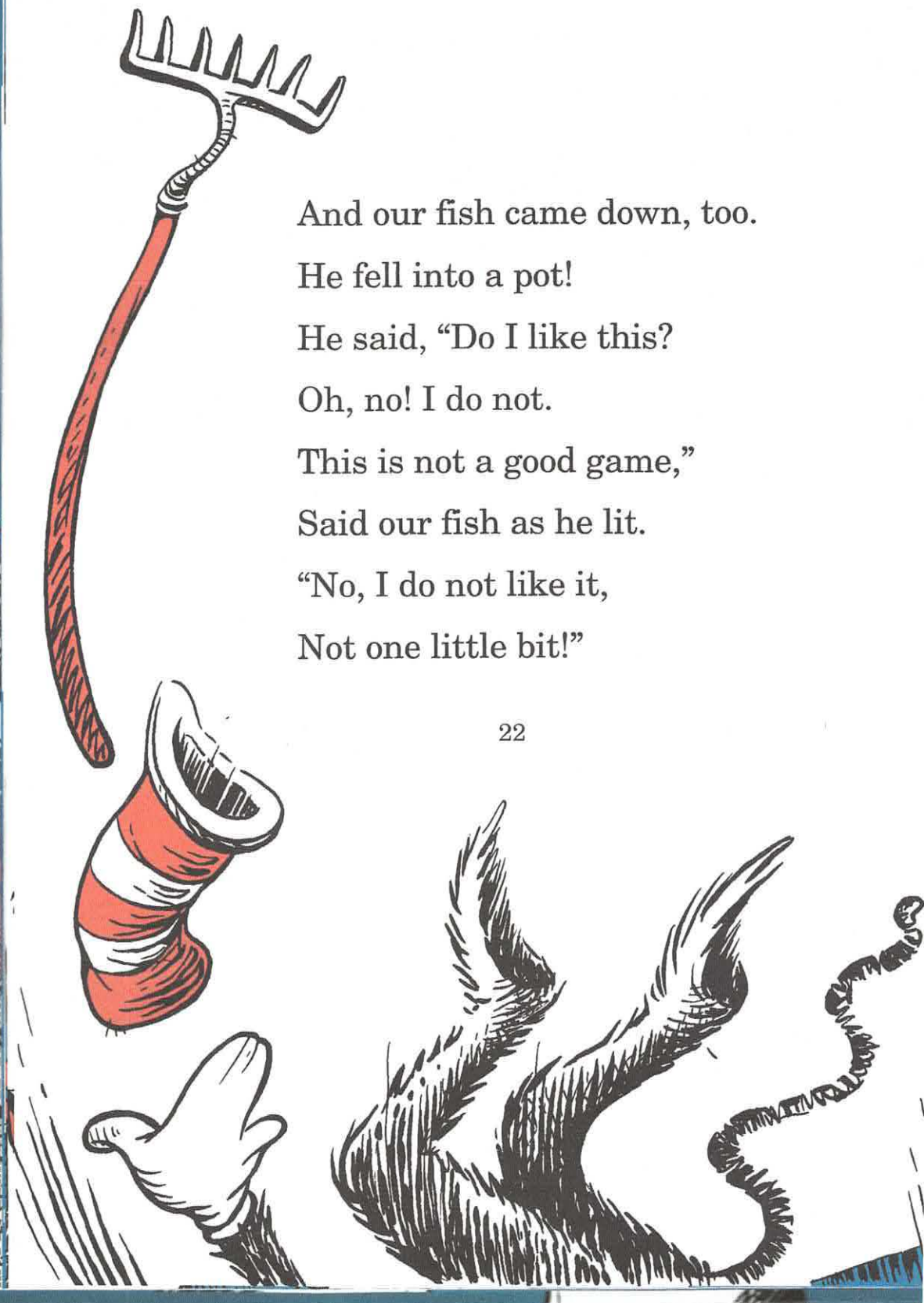




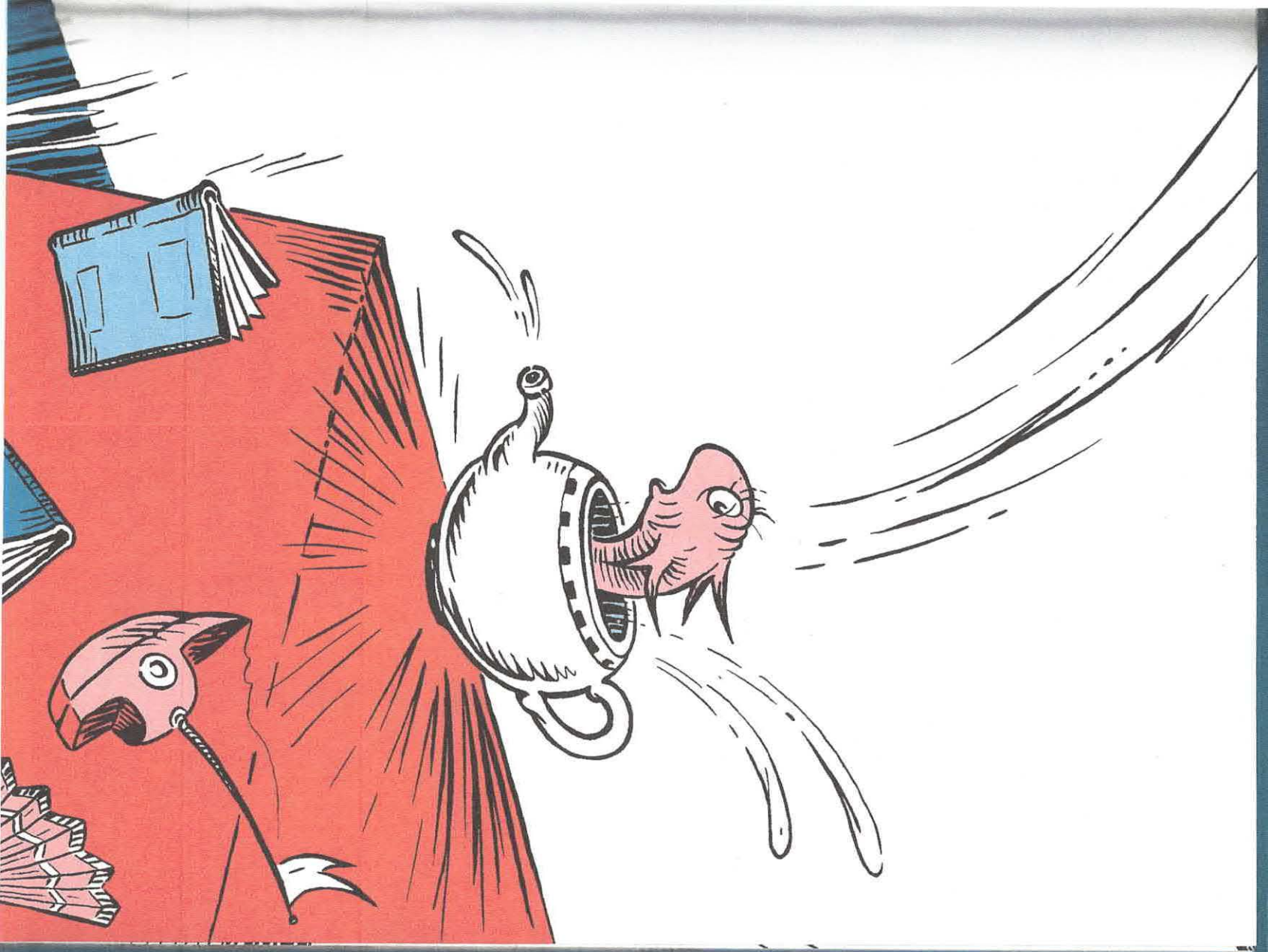


That is what the cat said . . .
Then he fell on his head!
He came down with a bump
From up there on the ball.
And Sally and I,
We saw ALL the things fall!

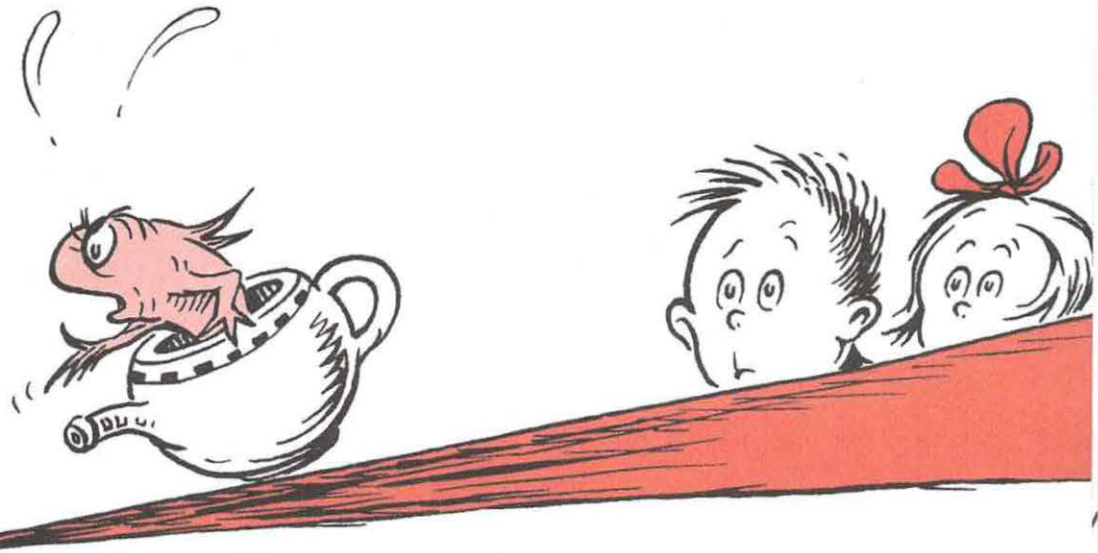




And our fish came down, too.
He fell into a pot!
He said, "Do I like this?
Oh, no! I do not.
This is not a good game,"
Said our fish as he lit.
"No, I do not like it,
Not one little bit!"



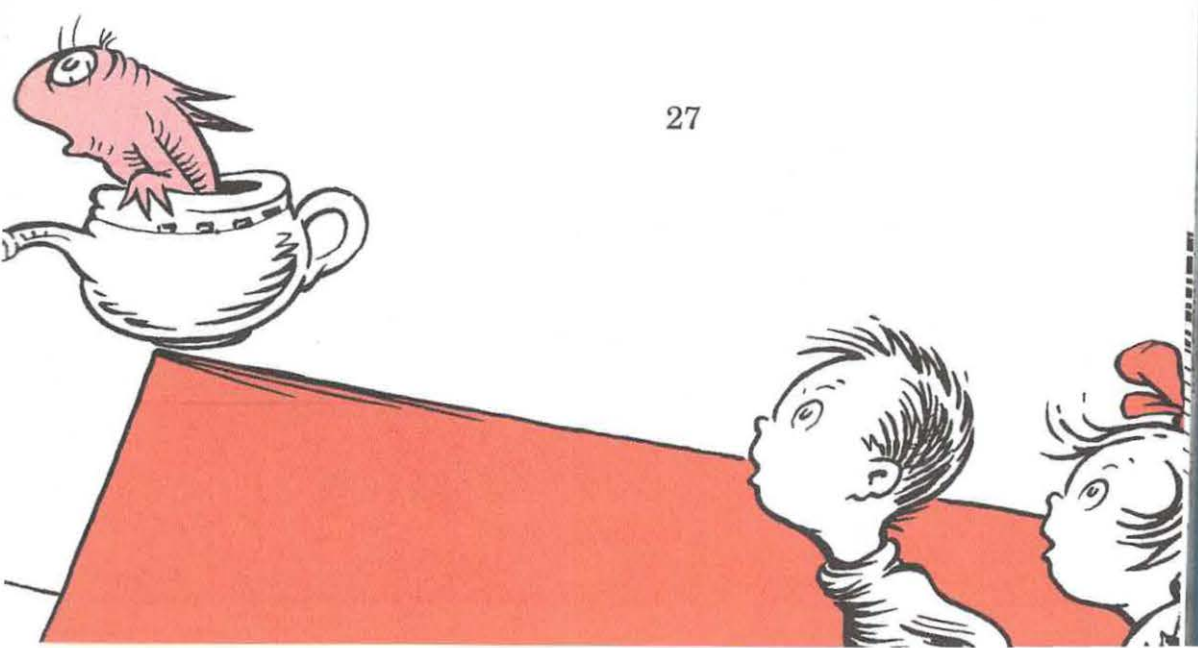


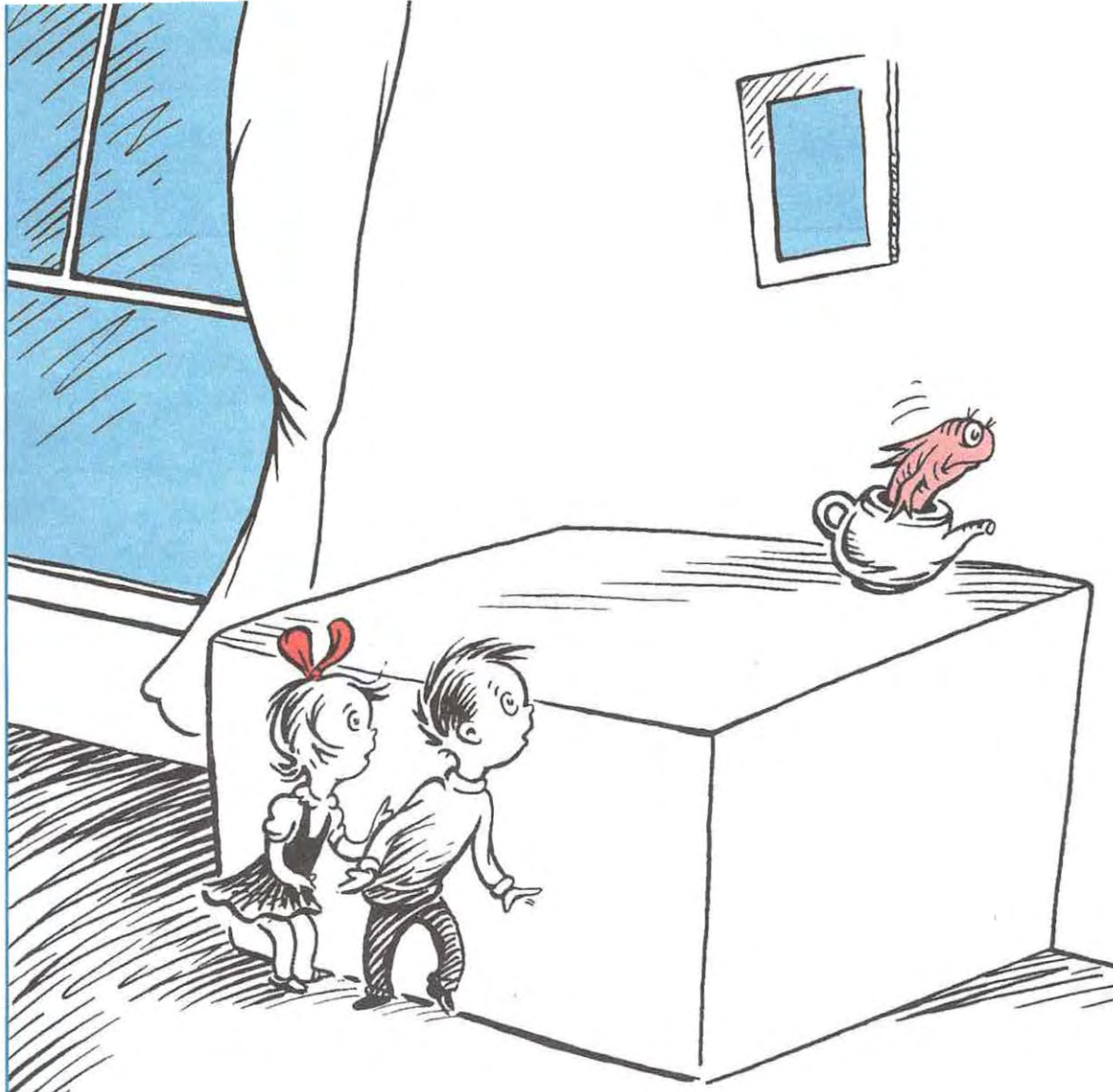


"Now look what you did!"
Said the fish to the cat.
"Now look at this house!
Look at this! Look at that!
You sank our toy ship,
Sank it deep in the cake.
You shook up our house
And you bent our new rake.
You SHOULD NOT be here
When our mother is not.
You get out of this house!"
Said the fish in the pot.



"But I like to be here.
Oh, I like it a lot!"
Said the Cat in the Hat
To the fish in the pot.
"I will NOT go away.
I do NOT wish to go!
And so," said the Cat in the Hat,
"So
so
so . . .
I will show you
Another good game that I know!"





And then he ran out.

And, then, fast as a fox,

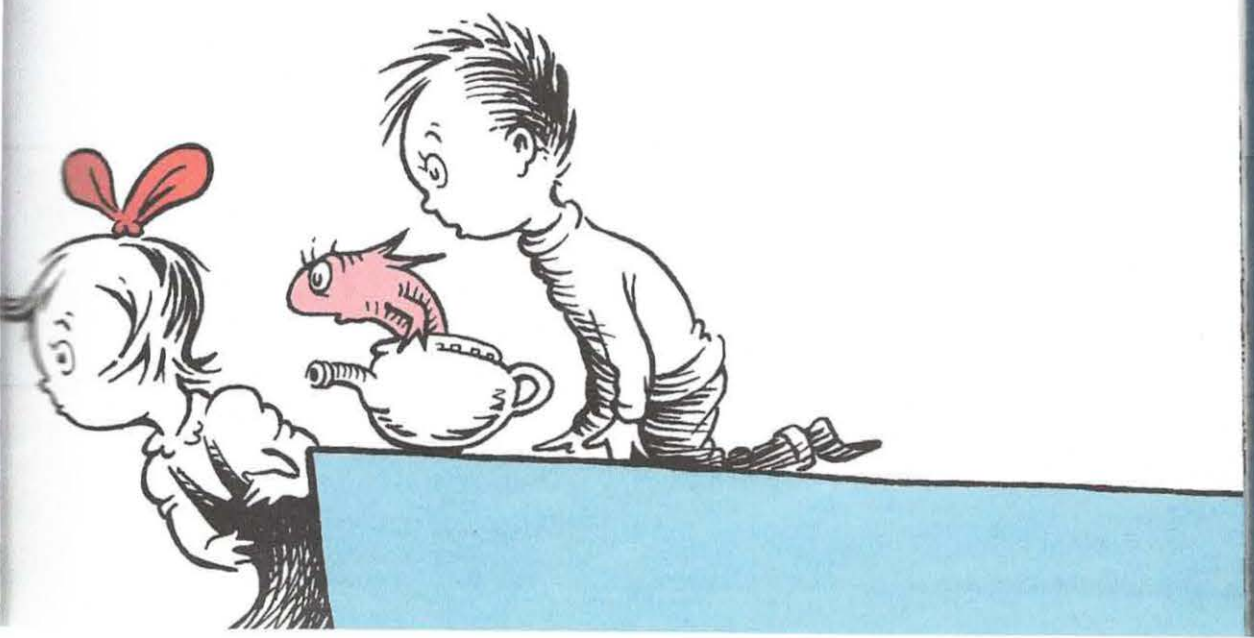
The Cat in the Hat

Came back in with a box.

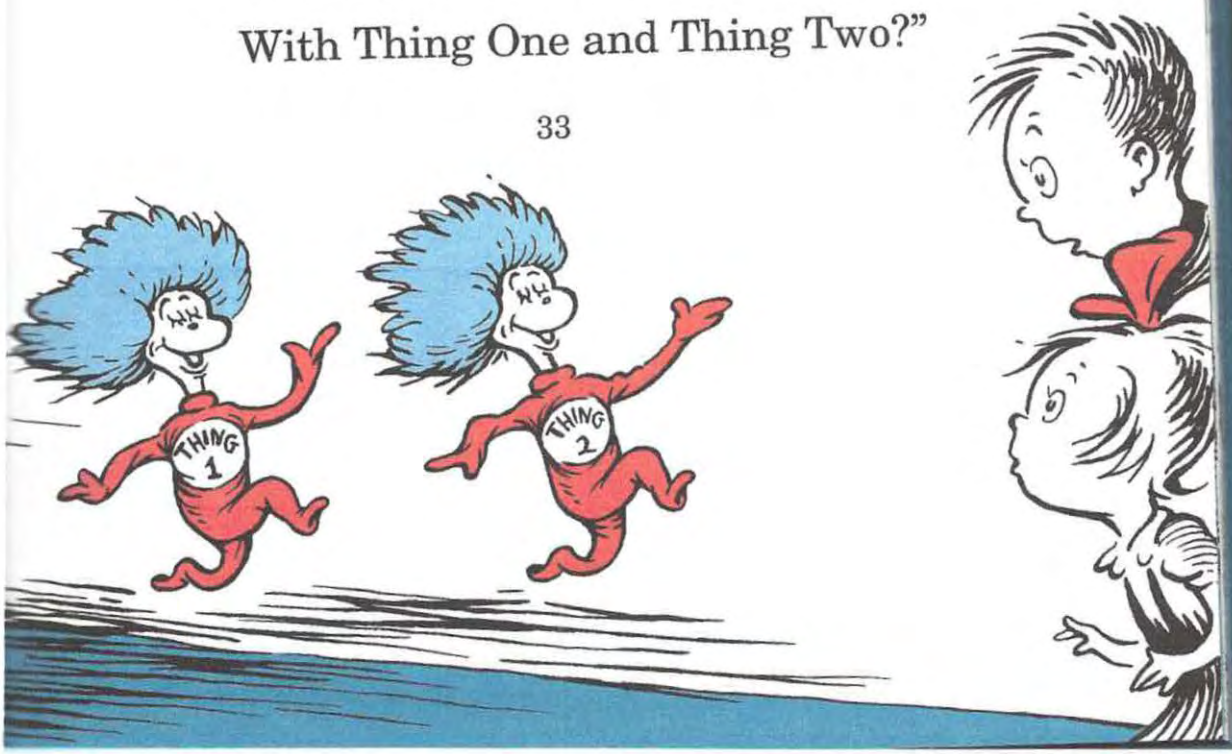


A big red wood box.
It was shut with a hook.
"Now look at this trick,"
Said the cat.
"Take a look!"

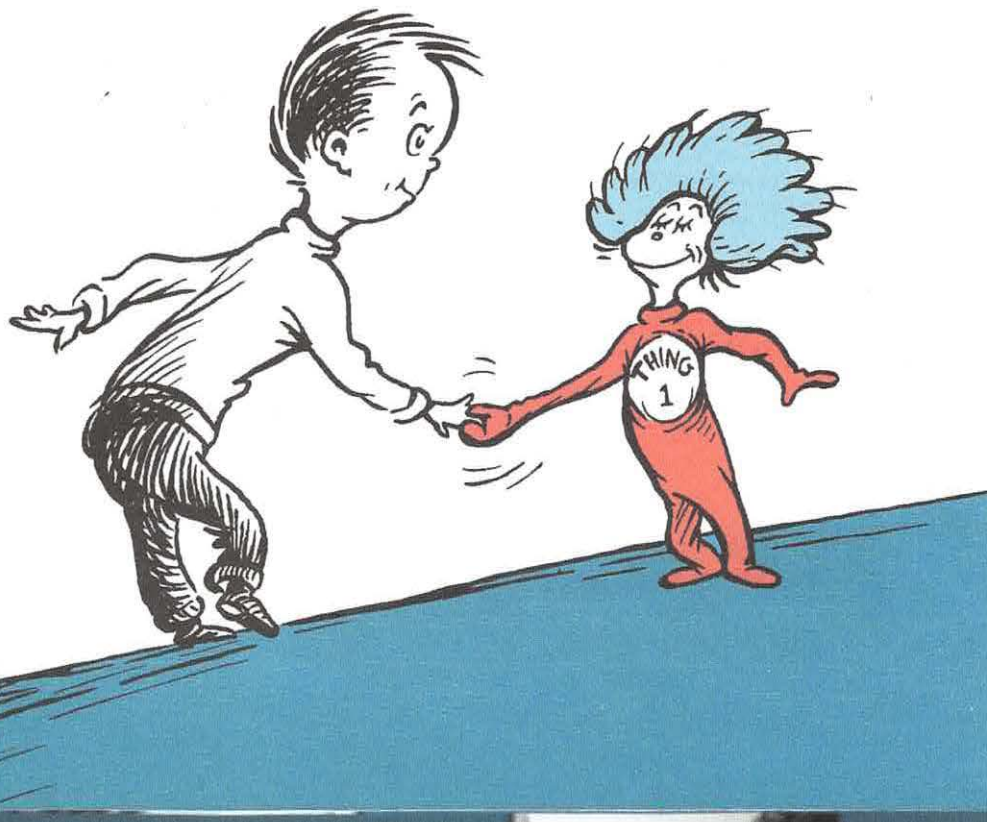
Then he got up on top
With a tip of his hat.
"I call this game FUN-IN-A-BOX,"
Said the cat.
"In this box are two things
I will show to you now.
You will like these two things,"
Said the cat with a bow.



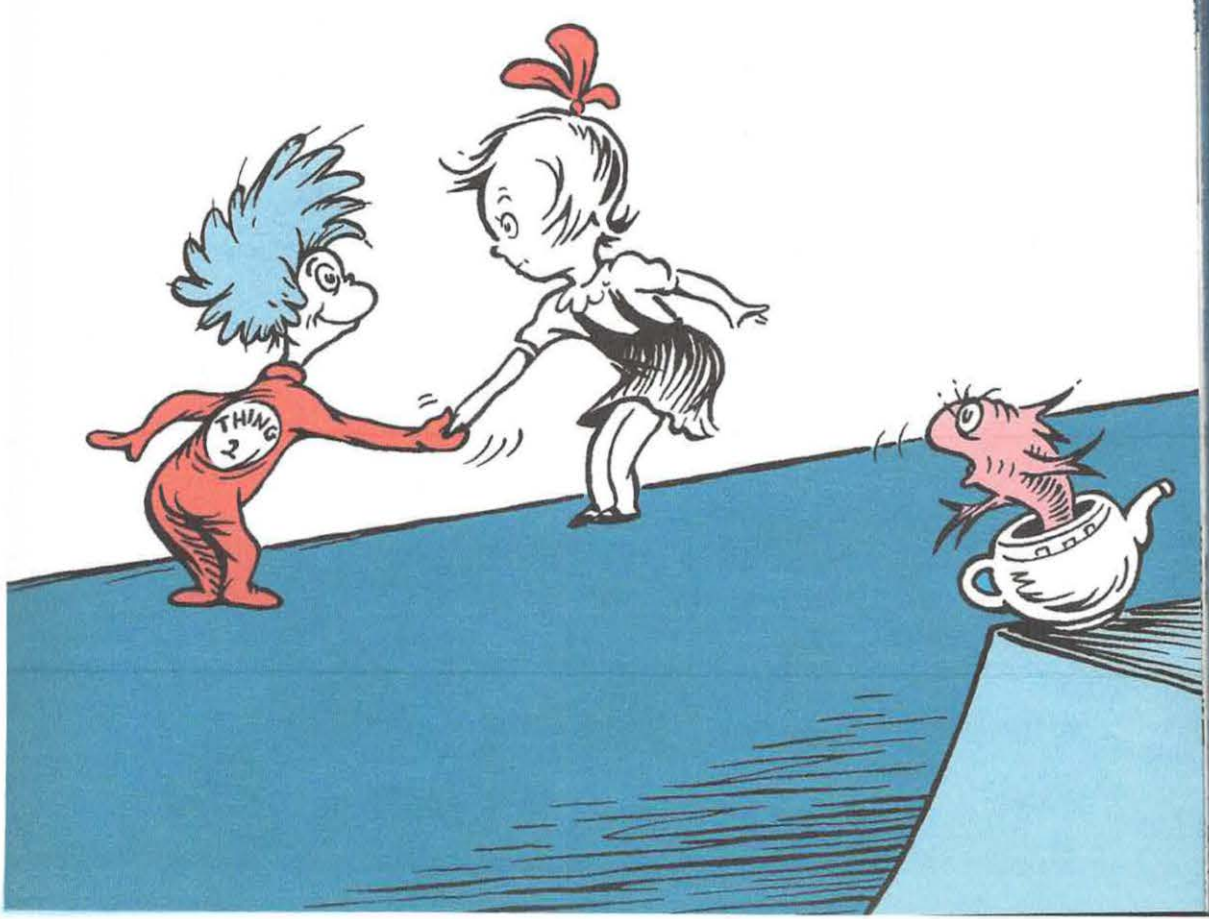
"I will pick up the hook.
You will see something new.
Two things. And I call them
Thing One and Thing Two.
These Things will not bite you.
They want to have fun."
Then, out of the box
Came Thing Two and Thing One!
And they ran to us fast.
They said, "How do you do?
Would you like to shake hands
With Thing One and Thing Two?"



And Sally and I
Did not know what to do.
So we had to shake hands
With Thing One and Thing Two.
We shook their two hands.
But our fish said, "No! No!
Those Things should not be
In this house! Make them go!

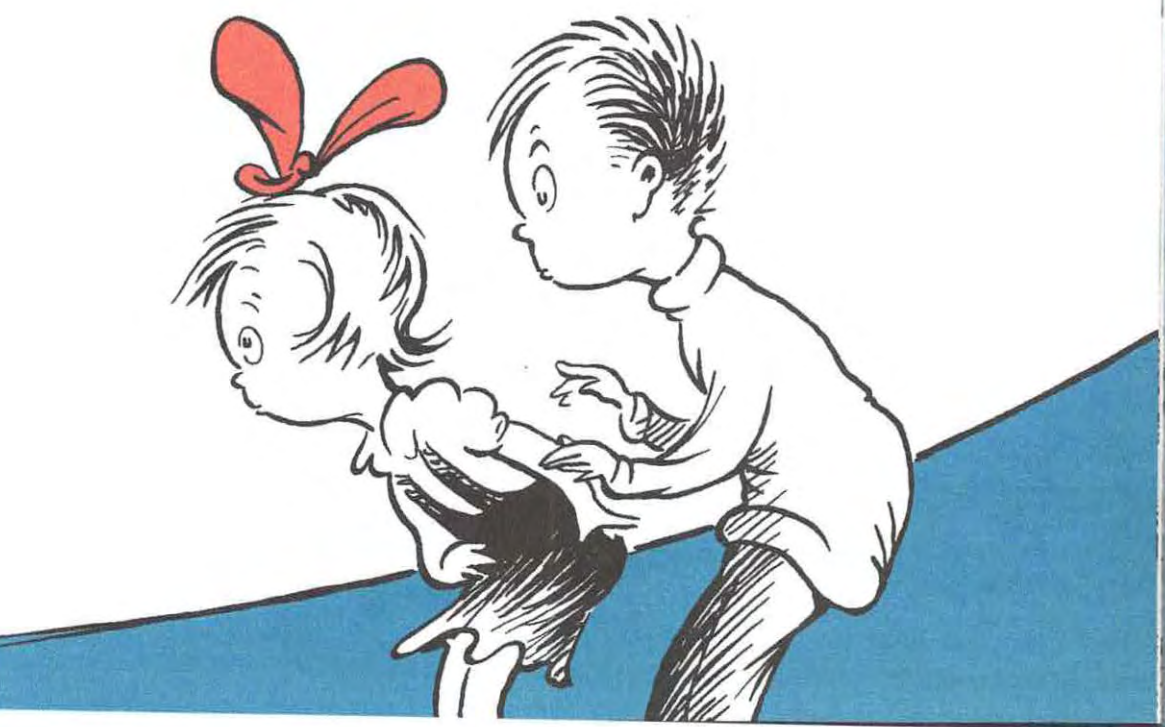


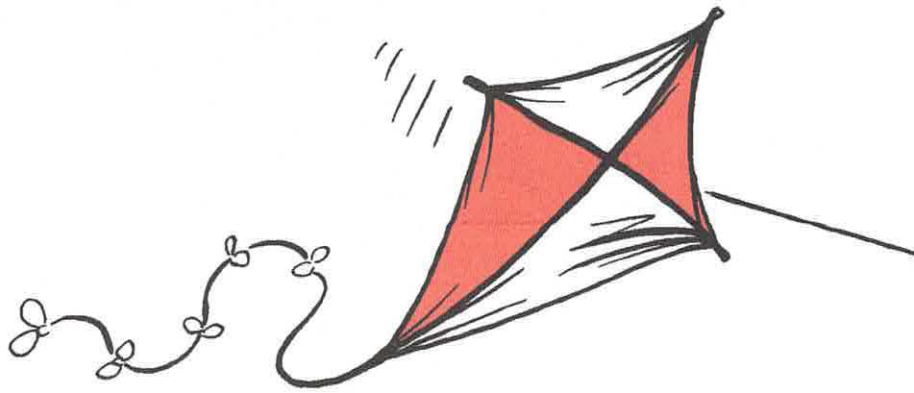
"They should not be here
When your mother is not!
Put them out! Put them out!"
Said the fish in the pot.



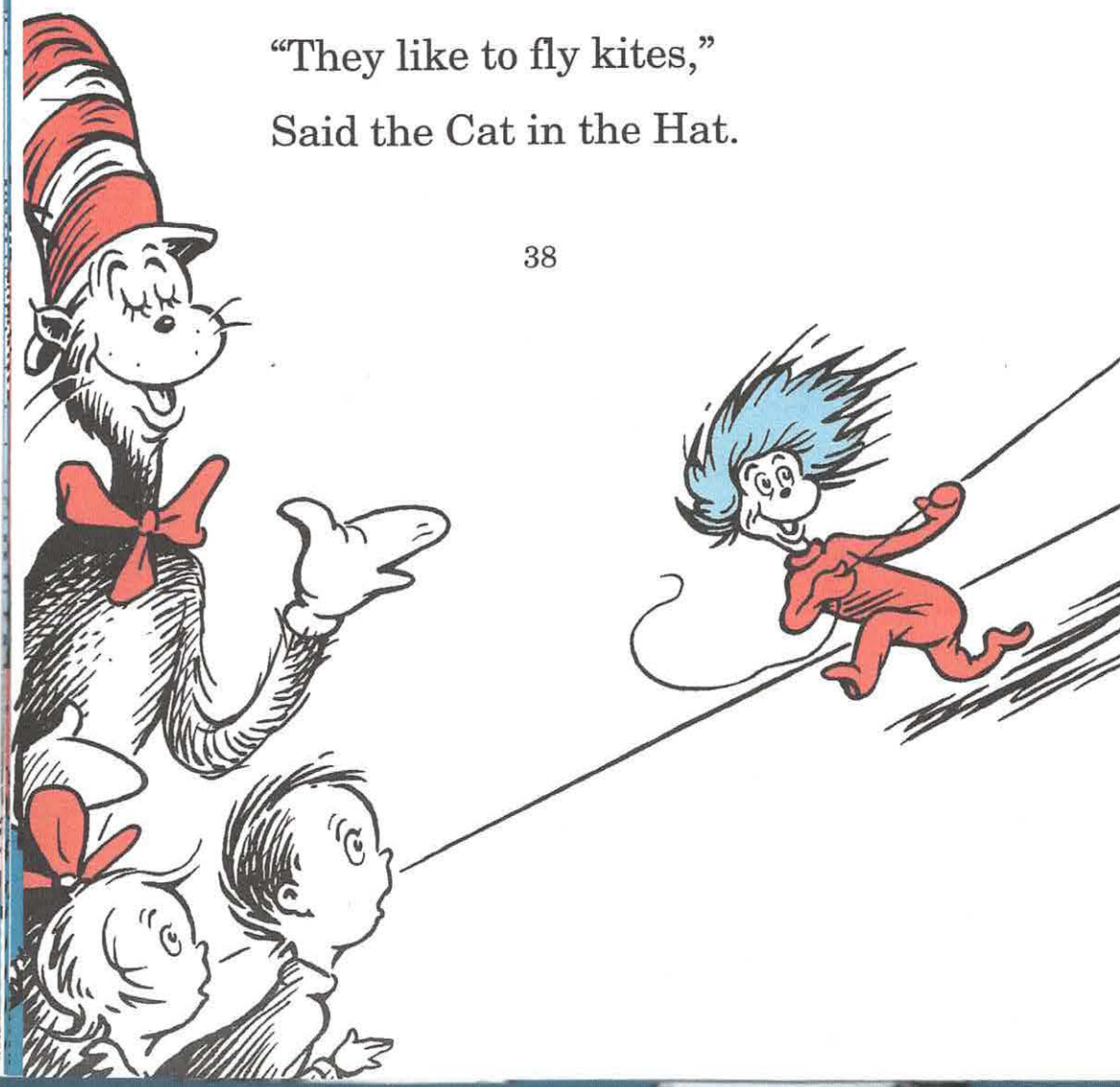


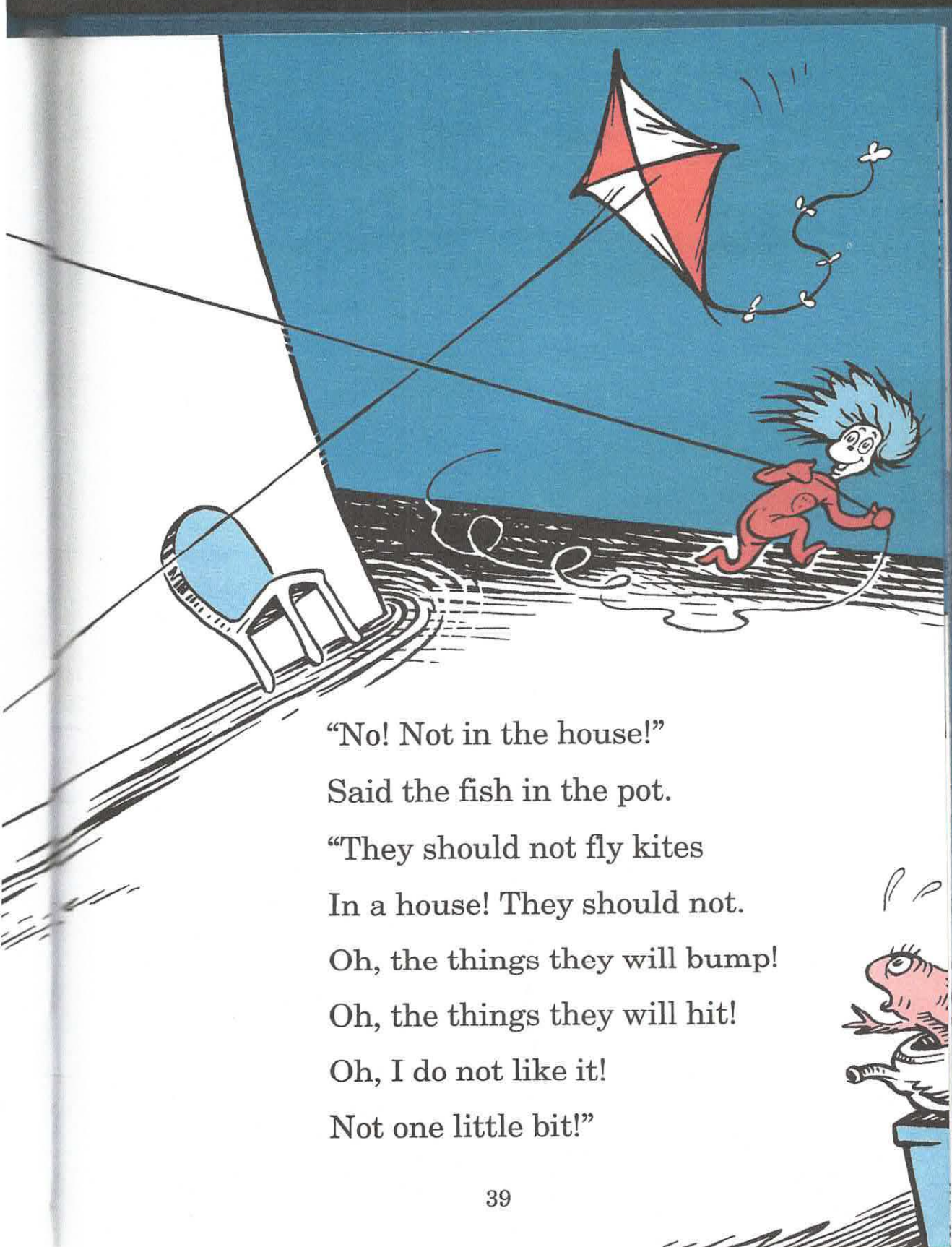
"Have no fear, little fish,"
Said the Cat in the Hat.
"These Things are good Things."
And he gave them a pat.
"They are tame. Oh, so tame!
They have come here to play.
They will give you some fun
On this wet, wet, wet day."



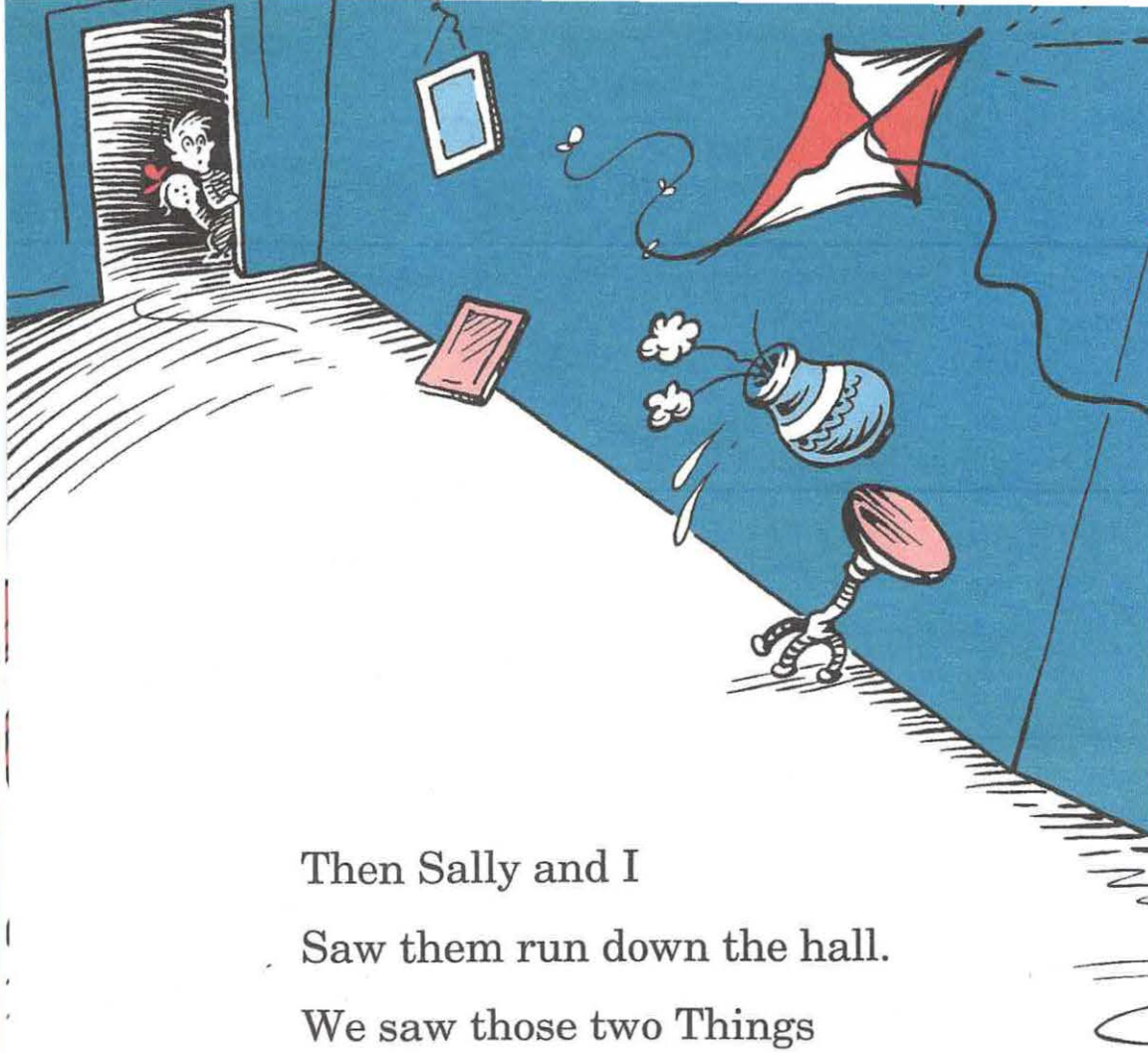


"Now, here is a game that they like,"
Said the cat.
"They like to fly kites,"
Said the Cat in the Hat.



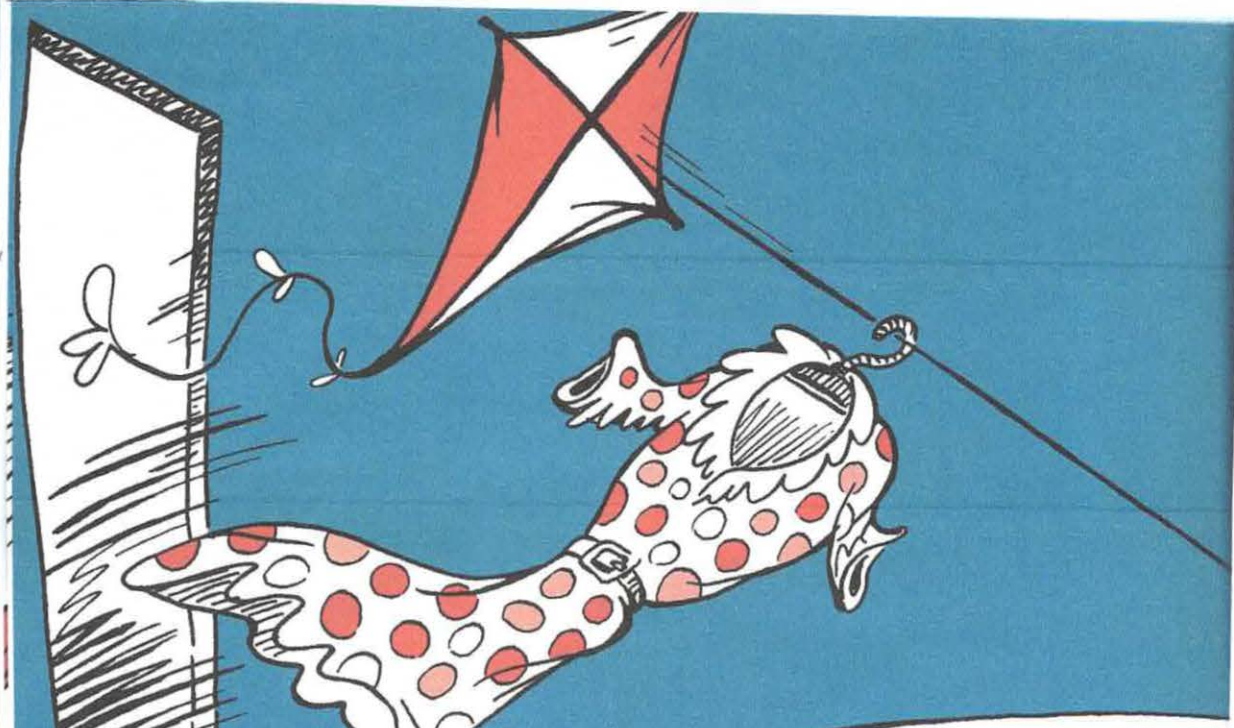


"No! Not in the house!"
Said the fish in the pot.
"They should not fly kites
In a house! They should not.
Oh, the things they will bump!
Oh, the things they will hit!
Oh, I do not like it!
Not one little bit!"



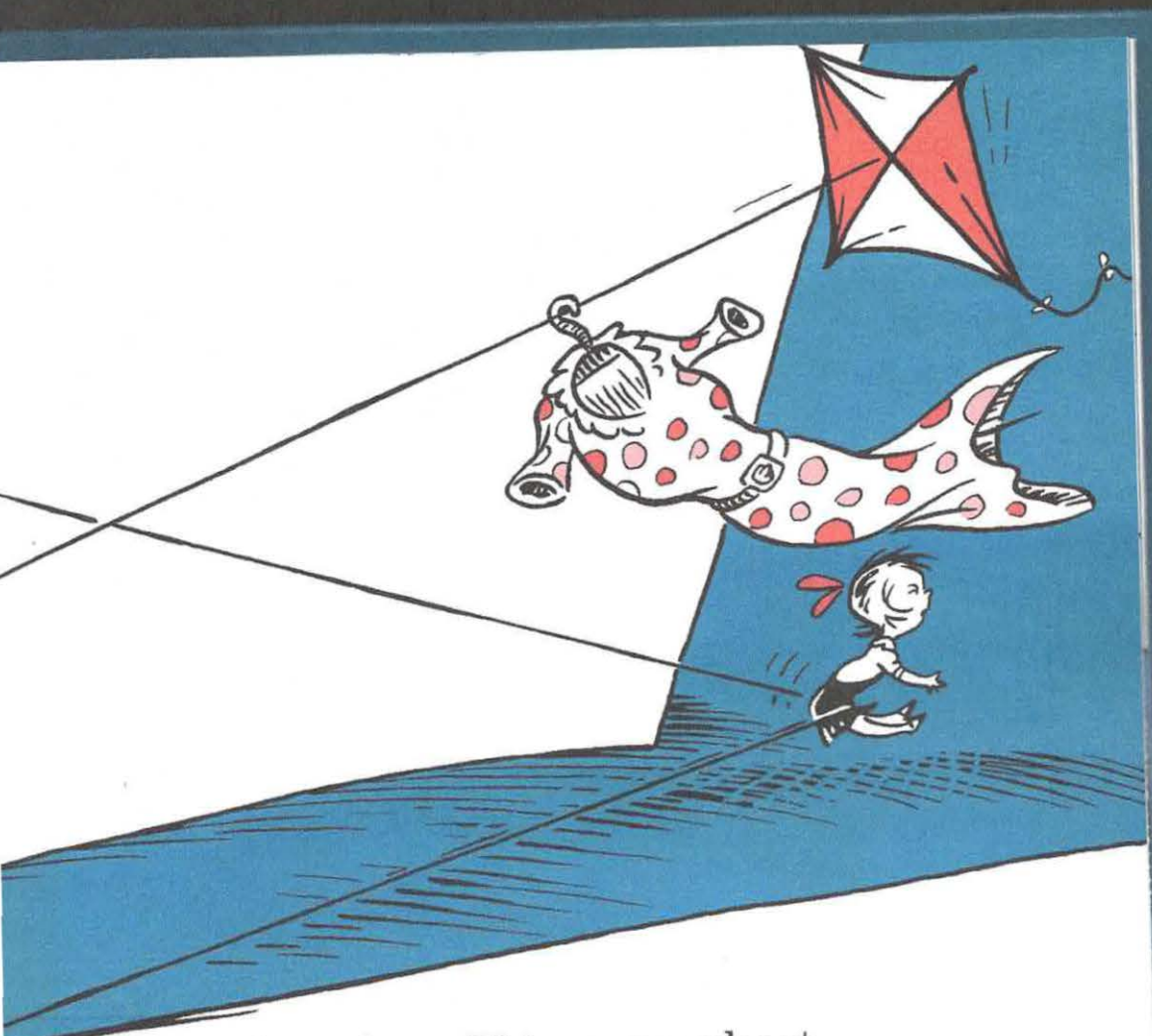
Then Sally and I
Saw them run down the hall.
We saw those two Things
Bump their kites on the wall!
Bump! Thump! Thump! Bump!
Down the wall in the hall.

THIN
1

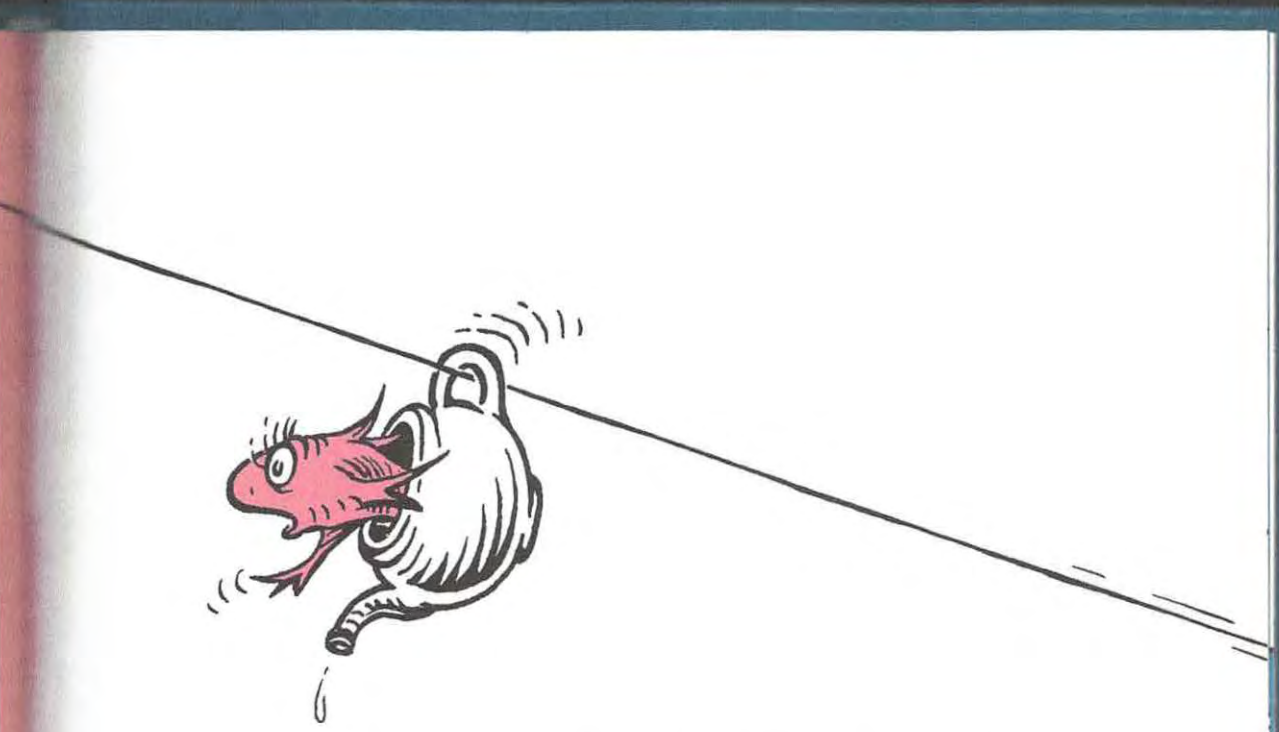


Thing Two and Thing One!
They ran up! They ran down!
On the string of one kite
We saw Mother's new gown!
Her gown with the dots
That are pink, white and red.
Then we saw one kite bump
On the head of her bed!





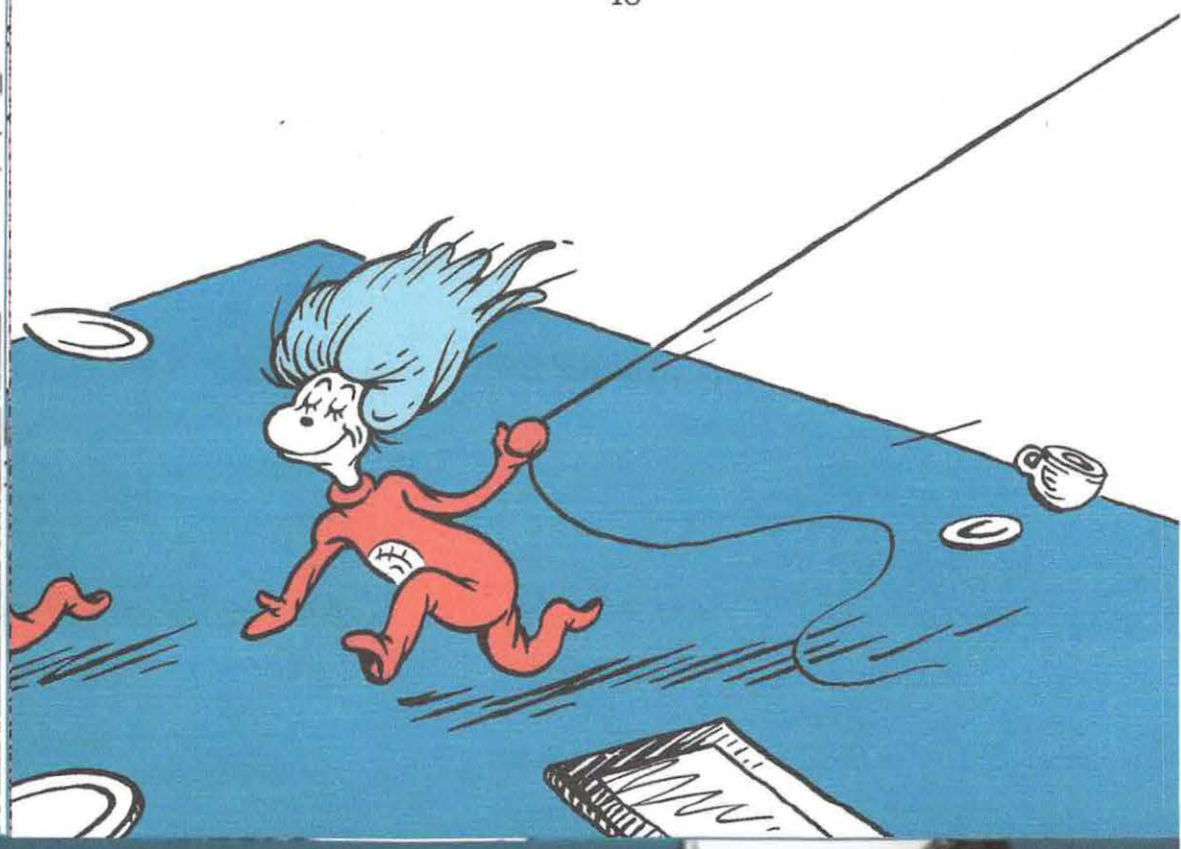
Then those Things ran about
With big bumps, jumps and kicks
And with hops and big thumps
And all kinds of bad tricks.
And I said,
"I do NOT like the way that they play!
If Mother could see this,
Oh, what would she say!"

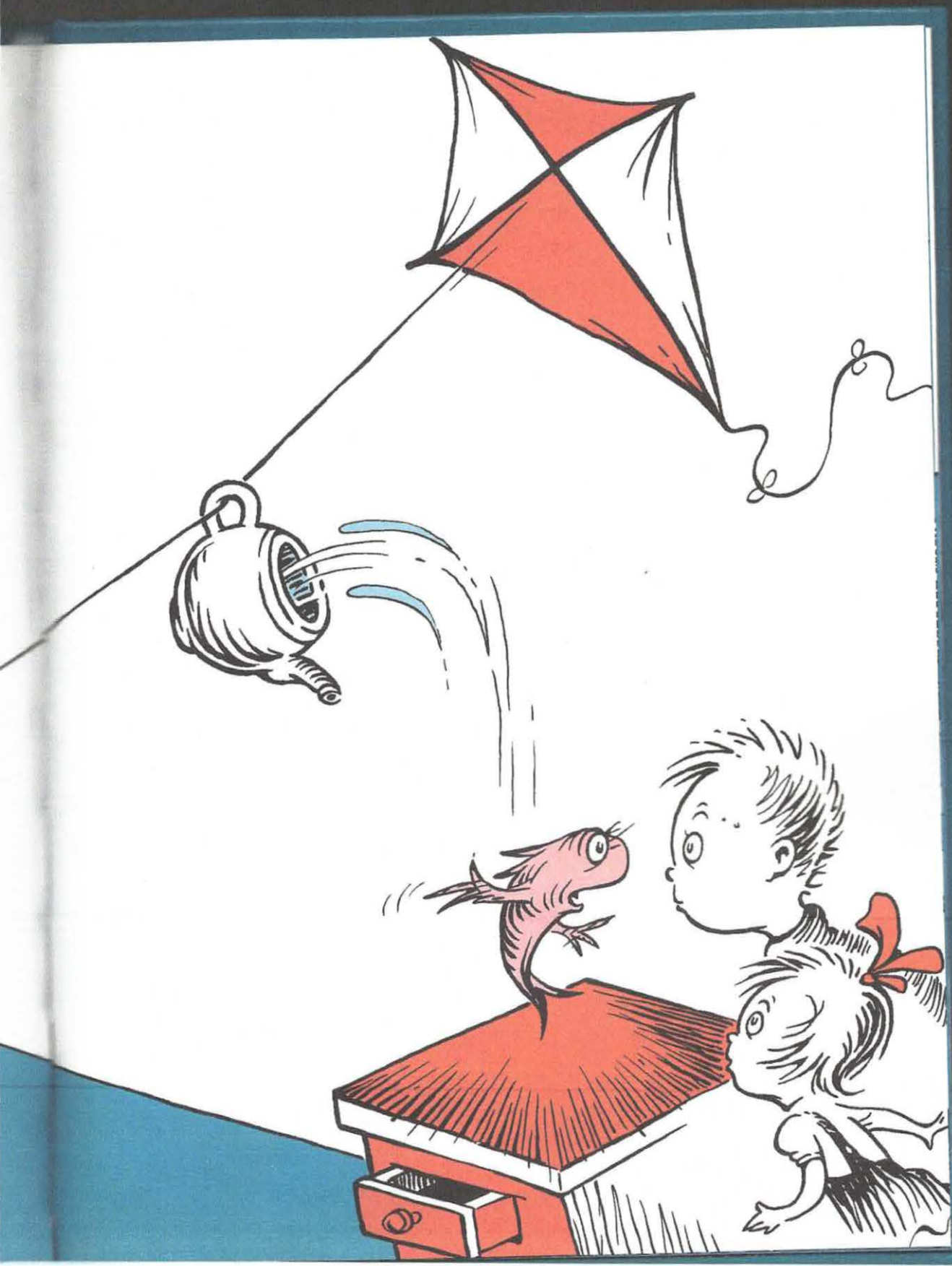


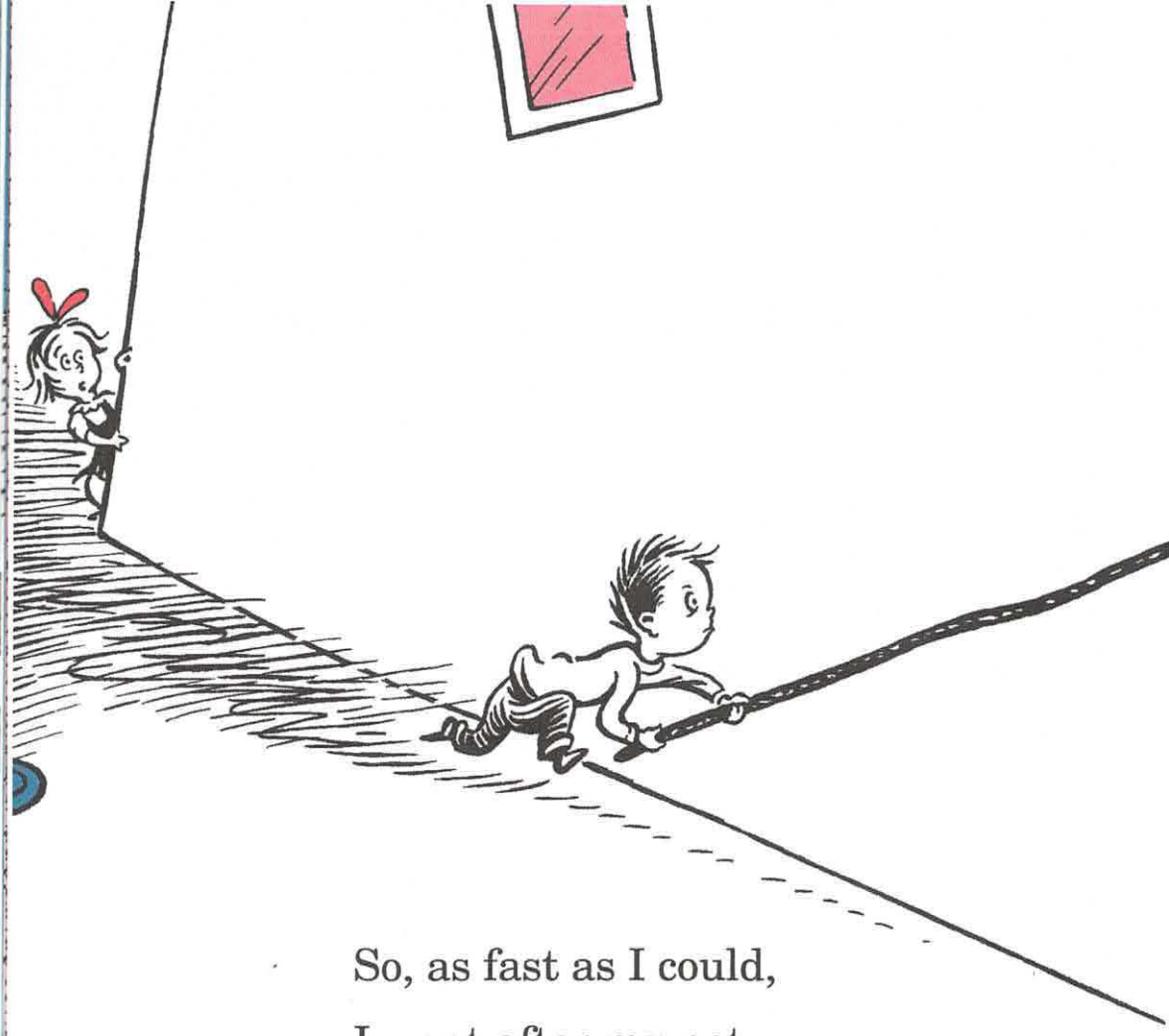
Then our fish said, "LOOK! LOOK!"
And our fish shook with fear.
"Your mother is on her way home!
Do you hear?
Oh, what will she do to us?
What will she say?
Oh, she will not like it
To find us this way!"



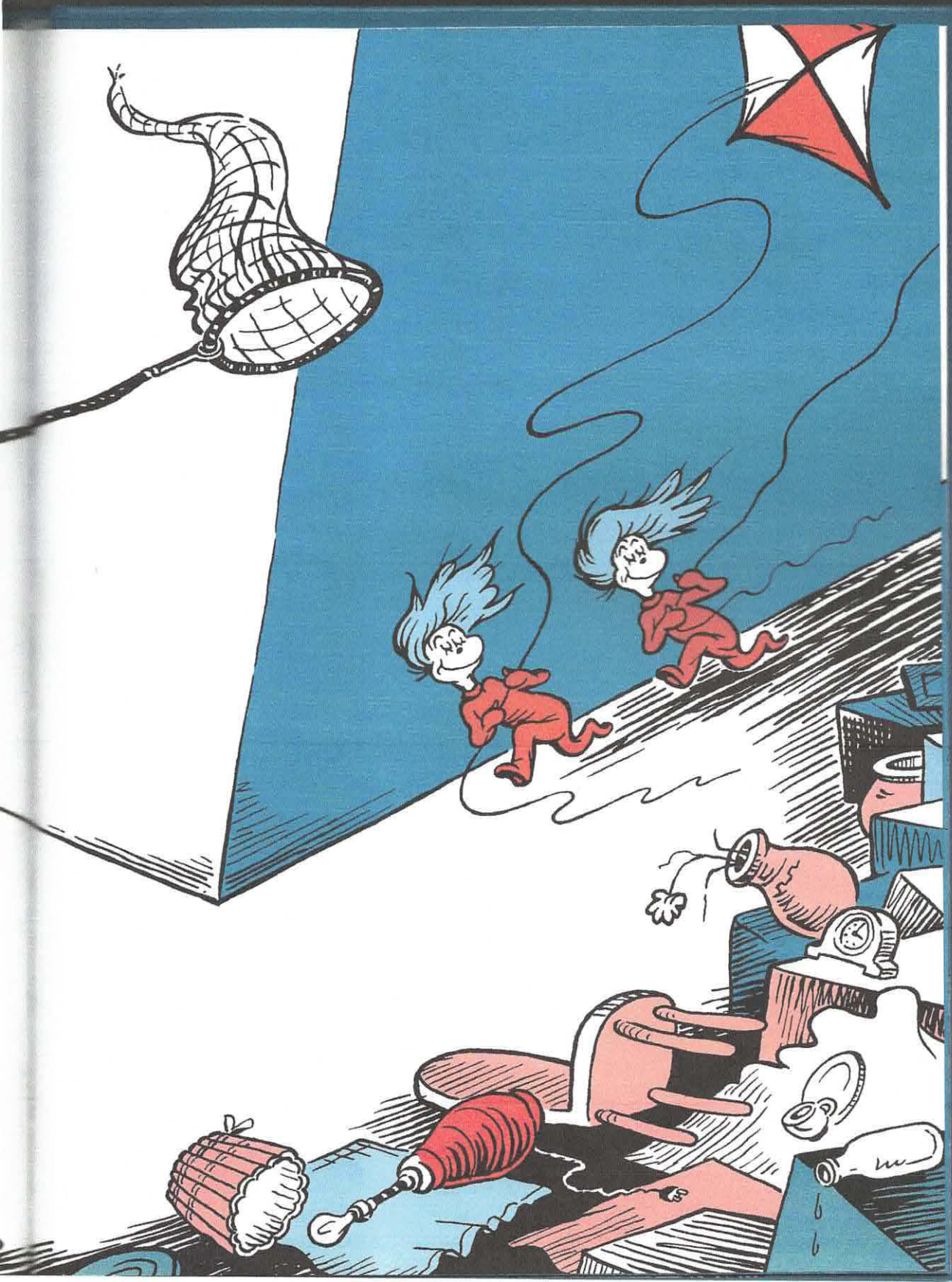
"So, DO something! Fast!" said the fish.
"Do you hear!
I saw her. Your mother!
Your mother is near!
So, as fast as you can,
Think of something to do!
You will have to get rid of
Thing One and Thing Two!"

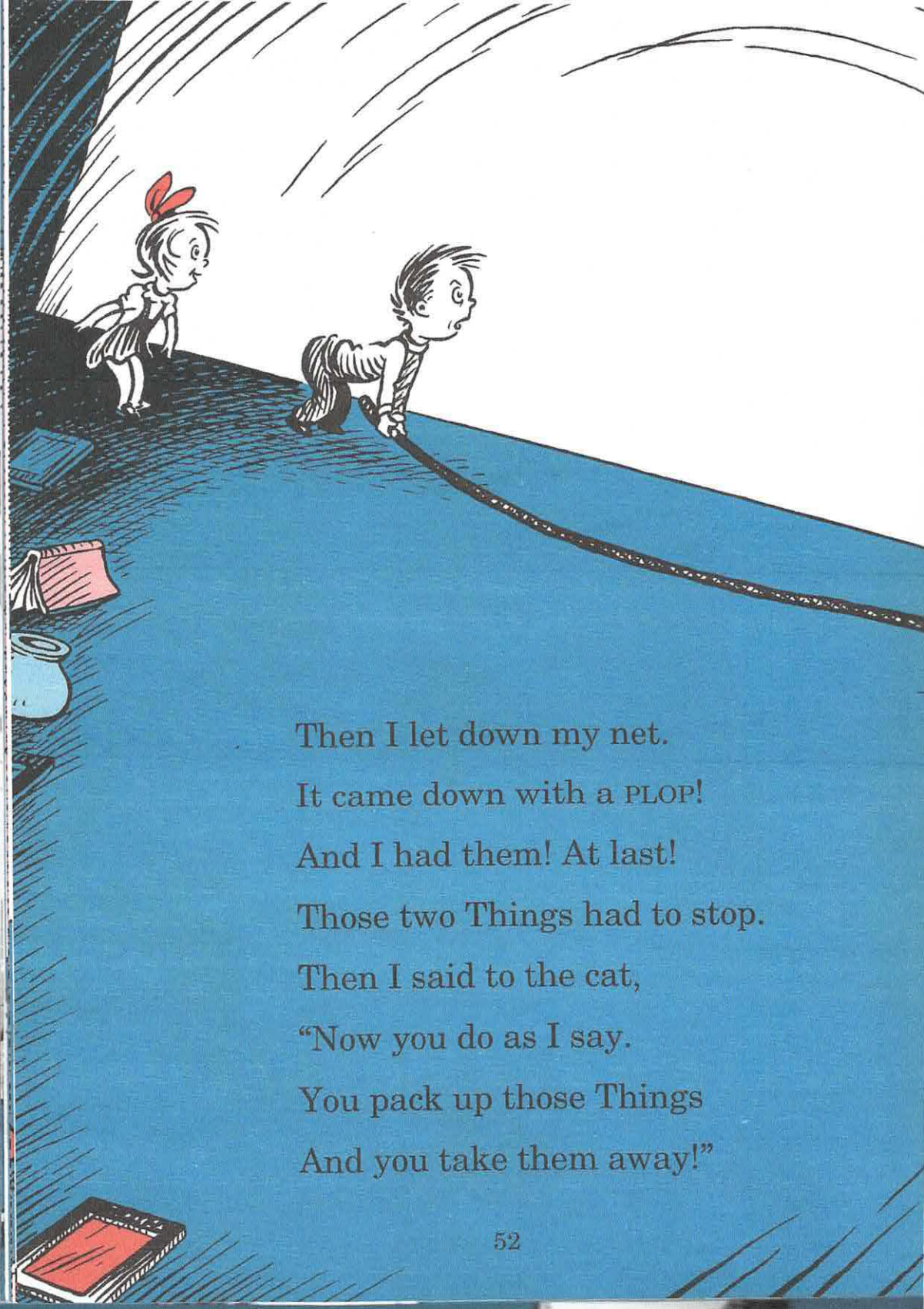




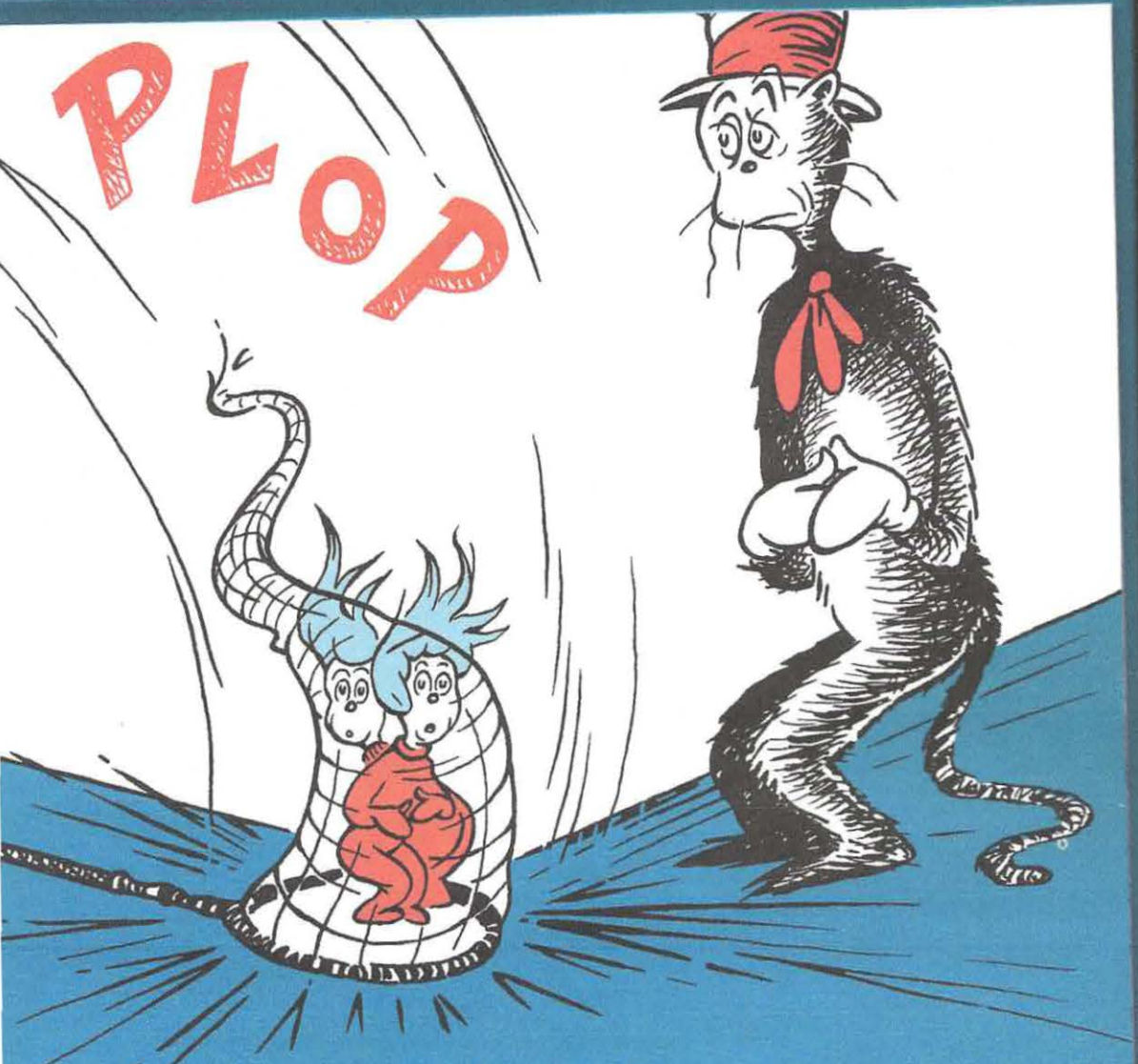


So, as fast as I could,
I went after my net.
And I said, "With my net
I can get them I bet.
I bet, with my net,
I can get those Things yet!"





Then I let down my net.
It came down with a PLOP!
And I had them! At last!
Those two Things had to stop.
Then I said to the cat,
"Now you do as I say.
You pack up those Things
And you take them away!"



"Oh dear!" said the cat.

"You did not like our game . . .

Oh dear.

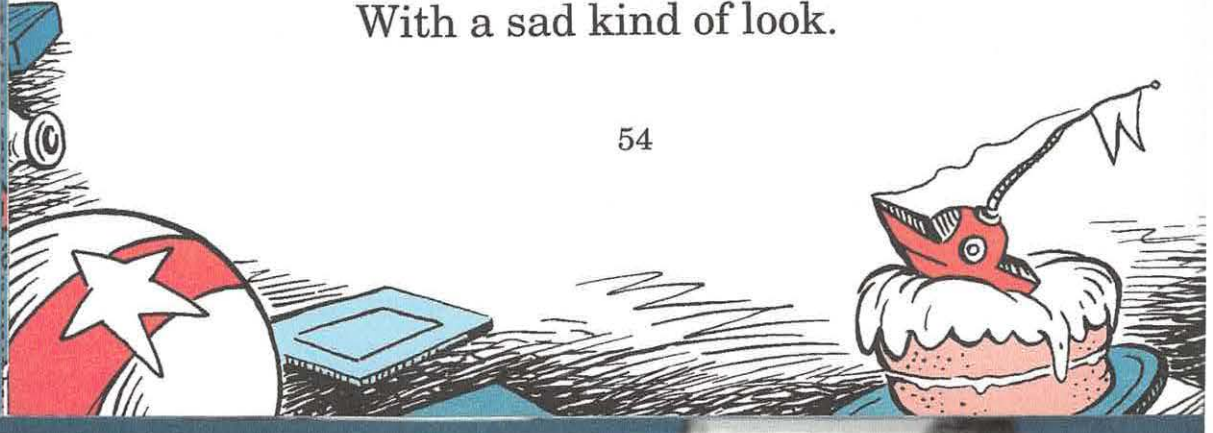
What a shame!

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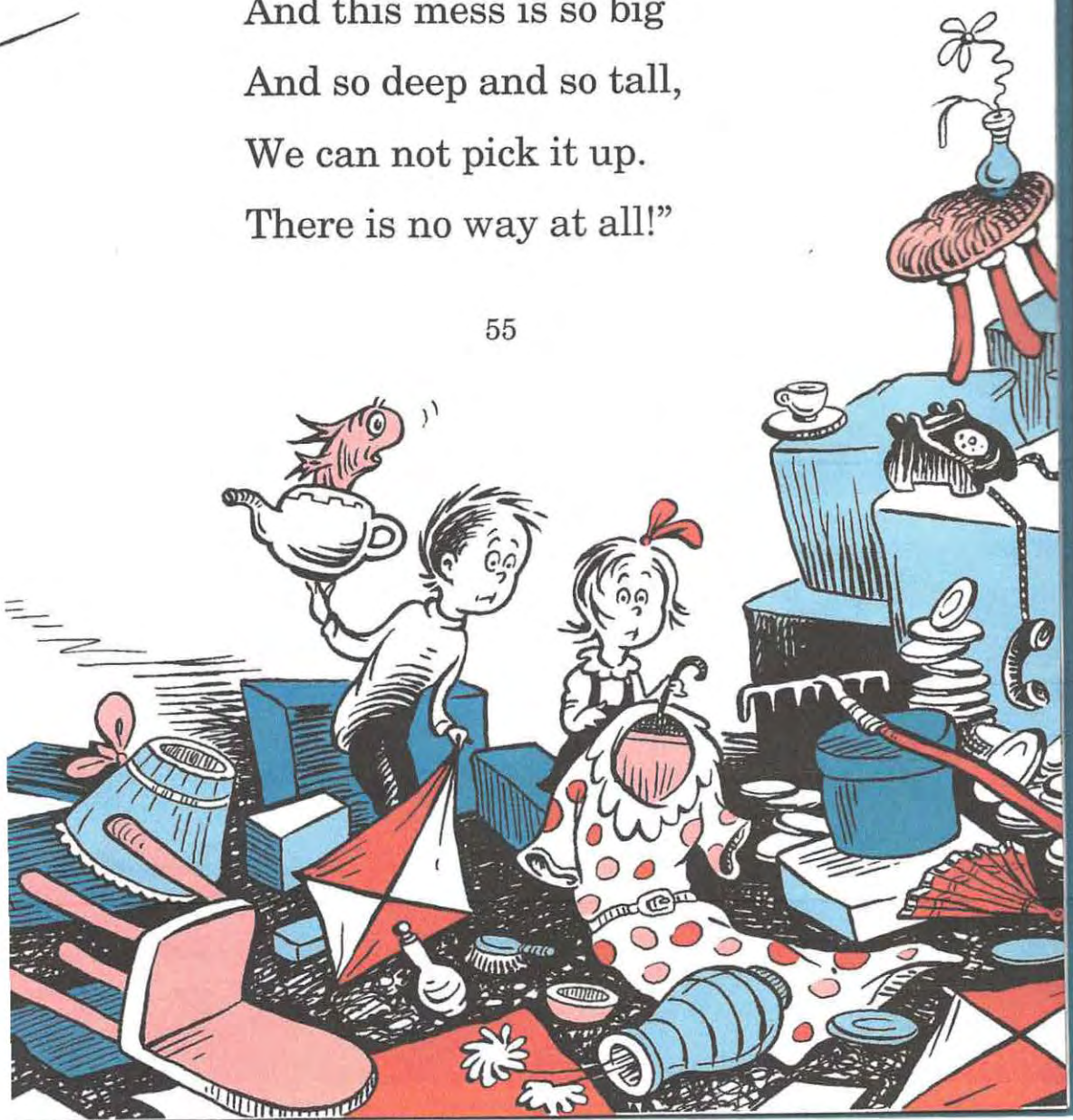
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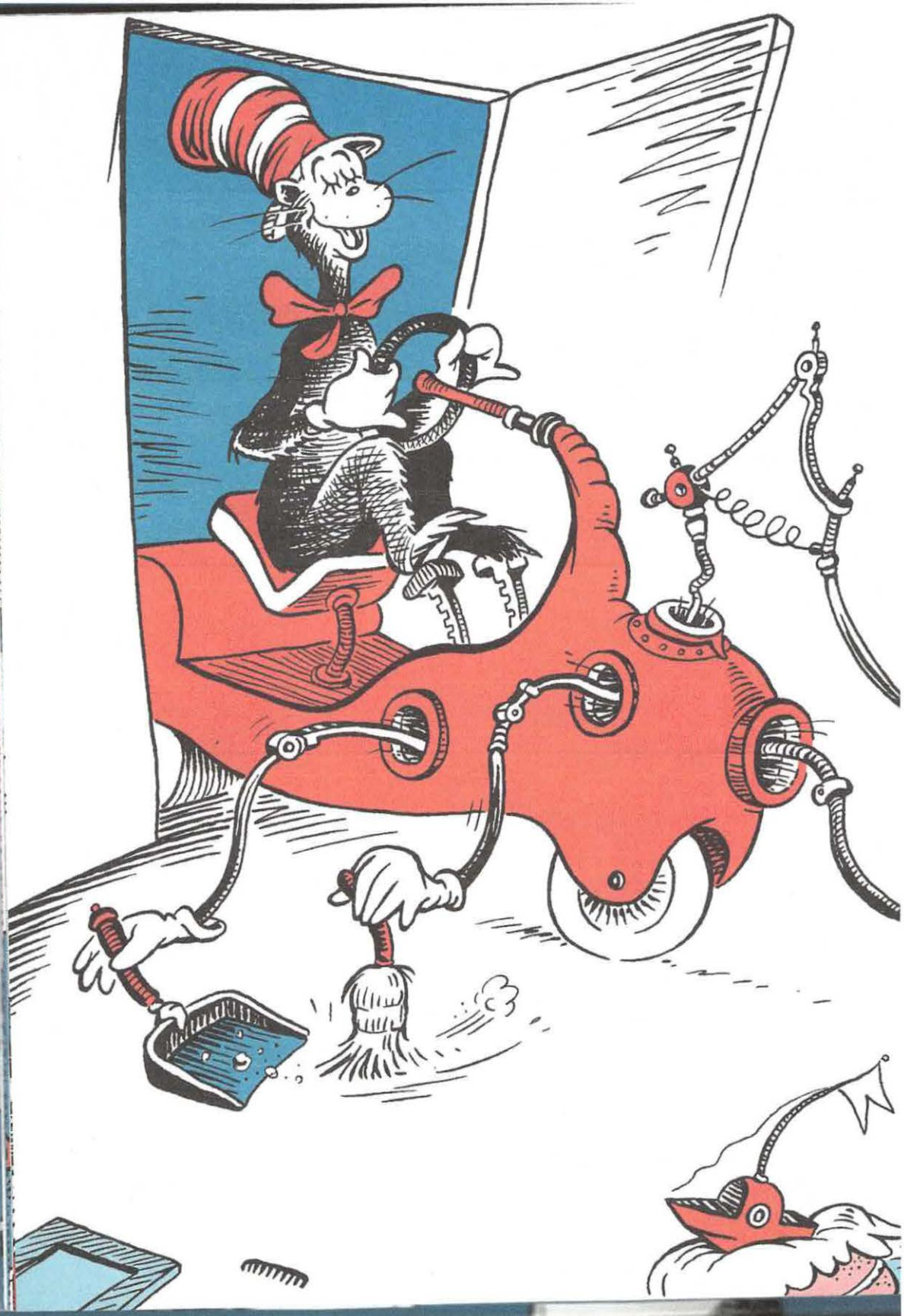


Then he shut up the Things
In the box with the hook.
And the cat went away
With a sad kind of look.



"That is good," said the fish.
"He has gone away. Yes.
But your mother will come.
She will find this big mess!
And this mess is so big
And so deep and so tall,
We can not pick it up.
There is no way at all!"





And THEN!

Who was back in the house?

Why, the cat!

"Have no fear of this mess,"

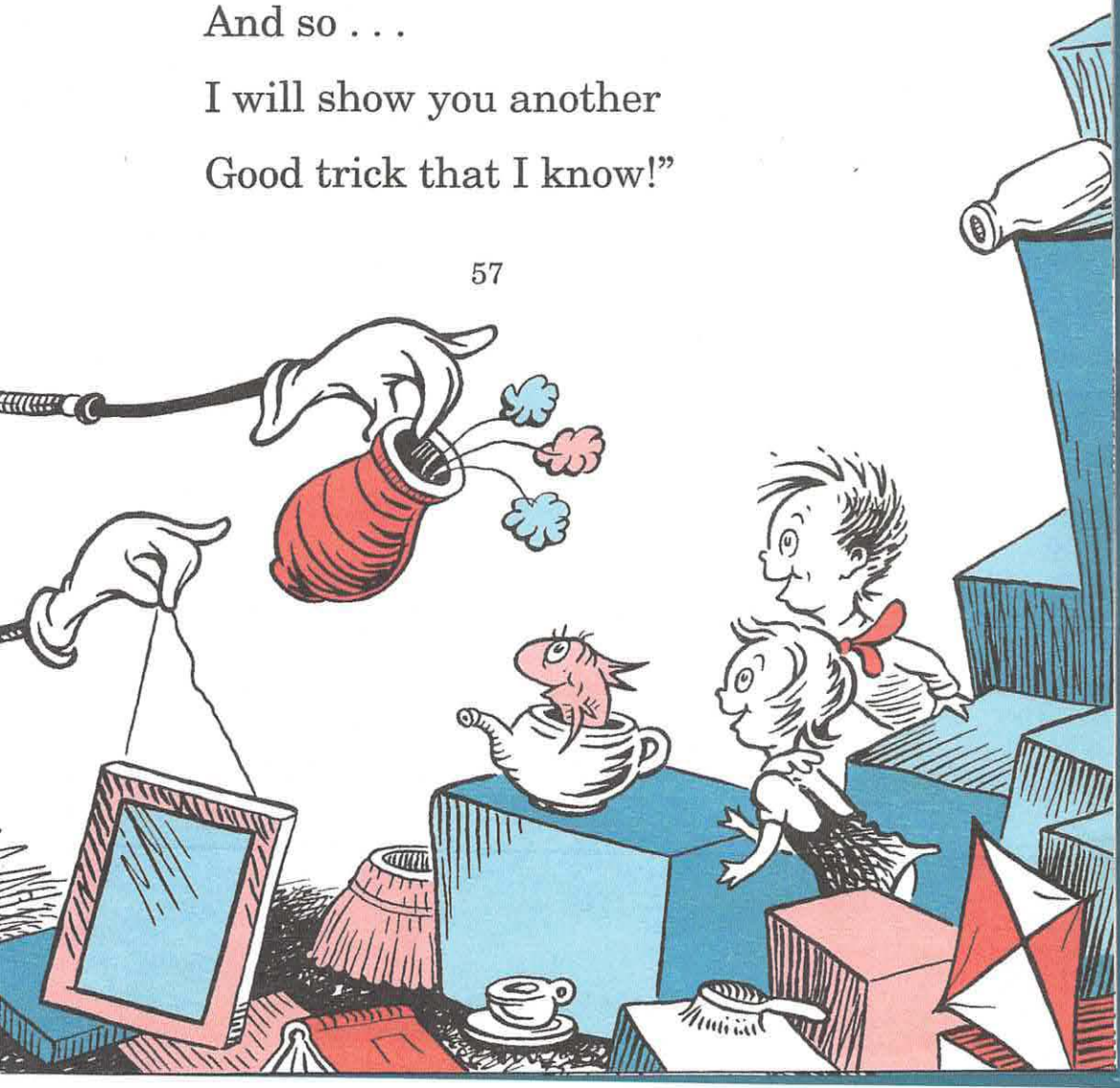
Said the Cat in the Hat.

"I always pick up all my playthings

And so . . .

I will show you another

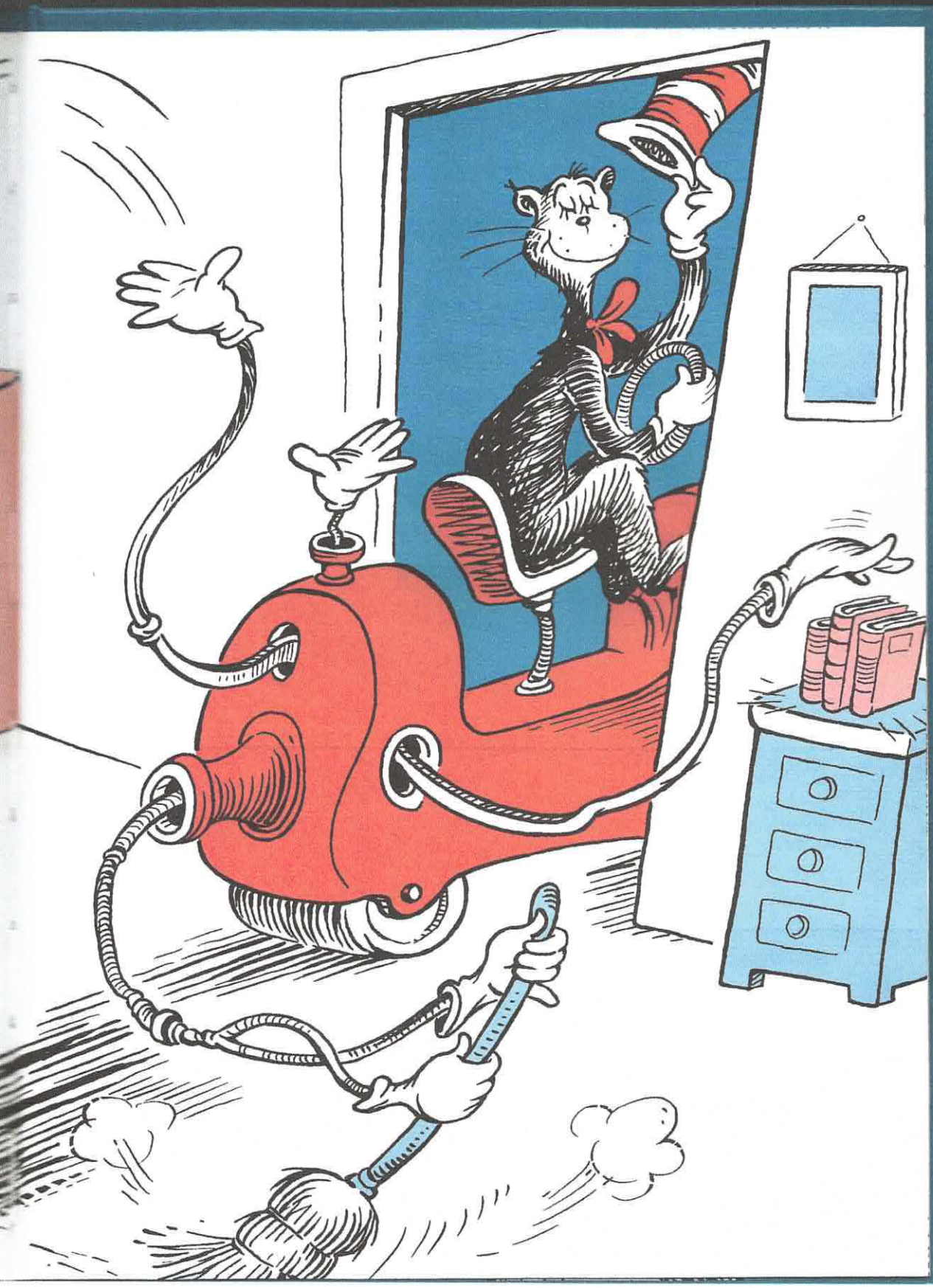
Good trick that I know!"





Then we saw him pick up
All the things that were down.
He picked up the cake,
And the rake, and the gown,
And the milk, and the strings,
And the books, and the dish,
And the fan, and the cup,
And the ship, and the fish.
And he put them away.
Then he said, "That is that."
And then he was gone
With a tip of his hat.







Then our mother came in
And she said to us two,
"Did you have any fun?
Tell me. What did you do?"

And Sally and I did not know
What to say.
Should we tell her
The things that went on there that day?



Should we tell her about it?

Now, what SHOULD we do?

Well . . .

What would YOU do

If your mother asked YOU?