

Isolating and Reorganizing Core Vocabulary from Library of Congress Music Headings for Use in the Music Thesaurus

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BACKGROUND

Impetus for creating a Music Thesaurus was triggered in 1989 by the Music Library Association Music Thesaurus Project Working Group's report, entitled "Improving Access to Music."¹ The central need articulated in this report was the development of "a controlled vocabulary that is more logically structured and more easily manipulated" than that found in Library of Congress subject headings (LCSH).

Despite its widespread usage, there are many inconsistencies in the structure and scope of LC subject headings which affect its success both as an indexing and a searching vocabulary and which bring into question LCSH's claim to being a thesaurus. These weaknesses, echoed in the MLA report, have not gone unnoticed by other practitioners and patrons.^{2 3 4}

Criticism centers on the facts that LCSH is a list of inconsistently established headings, providing uneven coverage of a multiplicity of topics, often representing pre-coordinated multi-faceted concepts. LC headings, at best, have varying levels of syndetic structure and were constructed on the basis of changing principles and patterns over time. The result is a tool that was not initially designed to be a thesaurus and today, despite its thesaurus-like qualities, fulfills that role imperfectly.

1. Mark McKnight and others, "Improving Access to Music: A Report of the MLA Music Thesaurus Project Working Group," NOTES 45:714 (1989).

2. Pauline A. Cochrane and Monika Kirtland, *Critical Views of LCSH, The Library of Congress Subject Headings: A Bibliographic and Bibliometric Essay and an Analysis of Vocabulary Control in the Library of Congress List of Subject Headings* (Syracuse, NY: ERIC Clearinghouse on Information Resources, ED208 900, 1981).

3. Mary Dykstra, "LC Subject headings disguised as a thesaurus," *Library Journal* 113:42-46 (1988)

4. Mary Dykstra, "Can subject headings be saved?" *Library Journal* 113:55-58 (1988)

One possible alternative to LCSH is the creation of subject-specific thesauri, such as the Music Thesaurus. A thesaurus offers several improvements over LCSH. By definition, a thesaurus is a set of single-concept terms whose inclusion, form and syndetic relationships are rule-based and fit within a defined framework of the discipline or disciplines represented. This framework supplies users — catalogers, indexers and searchers — not only with terminology but also the essential rationale for using those terms. As candidate terms are added, they are placed within a context - a hierarchy of knowledge arranged from broader to narrower concepts. Synonyms and related terms, lead-in vocabulary, can be generously added once the basic terminology is established. As terms are used — whether as indexing or searching terms; whether individually or in combination — they carry with them the dimensions of their broader contexts. Contextual searching can then replace or be used in combination with keyword searching, with the end goal of opening the door to access.

Because of its widespread usage, LCSH cannot and should not be totally tossed aside to make room for new developments. As early as 1981, Cochrane encouraged the development of subject-specific thesauri to act as supplements to LCSH.¹ In this paper it will be shown how LCSH can act as a supplement to and even a foundation for the development of thesauri. LCSH offers substantial advantages for thesaurus building. It has a rich vocabulary which can be factored and enhanced. Its vocabulary contains not only phrases and words which describe various disciplines, but also encapsulates an inventory of fundamental concepts related to those disciplines. While it maintains a structurally inconsistent architecture, many of the contexts represented can be exposed and strengthened in a thesaurus. And because LCSH enjoys worldwide acceptance, it has a preeminence which cannot be ignored.

This paper recounts how analysis and evaluation of concepts represented and terms used in the Library of Congress music subject headings is leading to the organization of a formal Music Thesaurus — a thesaurus which is tied both conceptually and through a shared vocabulary directly to Library of Congress Subject Headings.

A Preliminary Music Thesaurus

Preliminary work on the Music Thesaurus began in 1991 with funding from the Council on Library Resources. A computer database was created of LC music subject headings based on the 1988 Soldier Creek publication, *Music Subject Headings*, and updated from online sources with headings issued through September 1991.² The database was then compiled into a “thesaurus” — one that clearly showed, both online and in print, the thesaurus-like structure built into the LC music headings. In this new thesaurus format, the subject headings could be viewed and searched for in three standard projections — in an alphabetical index, in separate thesaurus records, and in a hierarchical tree display. The ARIS software used to produce the thesaurus also generated printed

1. Pauline A. Cochrane and Monika Kirtland, *Critical Views of LCSH*.

2. Perry Bratcher and Jennifer Smith, *Music Subject Headings Compiled from Library of Congress Subject Headings* (Lake Crystal, Minn.: Soldier Creek Press, 1988).

KWIC (keyword in context) and KWOC (keyword out of context) displays.¹ These were helpful once the formal job of designing the Music Thesaurus began in 1992.

Setting Goals

LCSH was analyzed to determine how the subject of music is fundamentally approached and represented in the subject headings. Specific goals were to discover and enumerate three different kinds of information: vocabulary, concepts and contexts. Using this information as a basis, the overall plan was to design a multi-faceted framework that would serve as a foundation for the Music Thesaurus. The outline would contain a small number of root facets indicating the broadest concepts which could be found that were central in LC music headings. Extending from the root facets, narrower concepts could then be attached to eventually form contextual hierarchies. The narrower concepts within the hierarchies would represent specific musical instances retraceable in context to their broader root concepts.

It was realized that concepts represented by LCSH are rarely “basic” or single concepts. Rather, headings are likely to contain basic ideas expressed in combination with other ideas. Together they formed the multi-conceptual statements we call subject headings. Some examples of multi-conceptual subject headings are:

MUSIC AND ARCHITECTURE	(subject + subject)
WALTZES (PIANO)	(form + instrument)
FOLK SONGS, RUSSIAN	(form + language)

To complicate matters further, LC has organized a great proportion of its subject headings — single and multi-conceptual ones alike — in a thesaurus-like labyrinth where they are contextually linked with each other. This structure is a rambling, meandering plan, full of contradictions and omissions, but as you will see, it was invaluable in helping locate concepts which were later accepted, restated or rejected for use in the Music Thesaurus. And so, the major task became not only to dissect headings — to separate concepts found within headings into individual candidate descriptors — but also to dissect the thesaurus-like structure under which LC headings are stored.

DEVELOPING VOCABULARY ANALYSIS STRATEGIES

The first tactic was to survey all of the headings in order to discover and rank concepts represented. In an effort to get an overview of the almost 12,000 music headings, approximately 2,000 top terms in the LCSH structure were isolated and examined. The top terms were found on the broadest hierarchical level of the LCSH display and had narrower but not broader links. While surveying this smaller set was helpful, many problems in the general structure of LCSH were revealed. The

1. Harriette Hemmasi, “ARIS Music Thesaurus: Another View of LCSH,” *Library Resources & Technical Services* 36:4 (1992).

large number of top terms was an immediate clue to the weak syndetic structure found in LCSH. The primary culprit, in this case, was determined to be the precoordinated multi-faceted statements. Instead of finding discrete concepts among the top terms, there was gross repetition of terminology and concepts. For example, all of the following headings were listed in the alphabetical sequence of LC music top terms:

- Harp and harpsichord music
- Harp and lute music
- Harp and organ music
- Harp and piano music
- Harp and piano music, arranged
- Harp music
- Harp music (Harps (2))
- Harp with brass ensemble
- Harp with chamber orchestra
- Harp with orchestra
- Harp with string orchestra
- Harp-lute guitar music

Another problem revealed while reviewing the top terms was that not all instances of a concept were linked to an existing broader term. Such was the case in the headings **LUTE** and **MANDOLIN**. Neither term was linked to the appropriate LC broader terms, **STRING INSTRUMENTS** or **PLECTRAL INSTRUMENTS**.

When lower levels in the LCSH hierarchies were examined, it was found that, in many cases, terms subordinate to a heading contained mixed categories. For example, consider the organization of the narrower terms for the heading:

MUSICAL INSTRUMENTS

NT: glass harmonica
hurdy-gurdy
Jew's harp
keyboard instruments
mouth organ
percussion instruments
stringed instruments
tuning
wind instruments

KEYBOARD INSTRUMENTS, PERCUSSION INSTRUMENTS, STRINGED INSTRUMENTS and **WIND INSTRUMENTS** clearly qualify as narrower terms to the heading **MUSICAL INSTRUMENTS**. However, **GLASS HARMONICA** could be subclassed as a percussion instrument, **HURDY-GURDY** as a stringed instrument, **JEW'S HARP** as an equivalent term for mouth harmonica, or harmonica, a wind instrument, whereas **TUNING** is a *process* related to musical instruments.

Analysis of the printed KWIC index generated from the headings coupled with online keyword searches provided another strategy for surveying concepts represented in LCSH. A search on the term **PIANO** brought together impressive numbers of headings. Among those headings retrieved were:

CHORUSES WITH PIANO
CONCERTOS (PIANO TRIO)
MINUETS (PIANO, 4 HANDS)
PIANO MAKERS
PIANO MUSIC
PIANO — METHODS

By examining each of these headings, it quickly became clear how keyword, or "same" vocabulary, could dramatically differ from same concept and more precisely, differ from same context. Within these six headings, there are six different "meanings" and/or contexts within which **PIANO** is used. In the first heading, **WITH PIANO** implies an accompaniment for a single piano, with one player. In the second heading, **PIANO TRIO** implies music written for an ensemble consisting of piano, violin, violoncello. **PIANO, 4 HANDS** in the third heading implies music for a single piano, with two players. The fourth heading, **PIANO MAKERS**, is a bound term (i.e., not two separate concepts), which might be classified as an agent or instrument makers, rather than a type of musical instrument or form. **PIANO MUSIC**, the fifth heading, includes all types of music for solo piano with one player. The last heading contains the term **PIANO** (defined as a single piano with number of players unidentified) which is subdivided or enhanced by the word **METHODS**, implying types of learning/teaching techniques.

As the selected headings above demonstrate, the multi-faceted, precoordinated LC headings made it difficult to isolate and extract a particular use or meaning of a term, even though the term, itself, was easily located. By contrast, once individual concepts or terms, such as **PIANO**, have been established and positioned in the context of a hierarchy in a thesaurus, terms can be intelligently selected — whether at the point of indexing or searching. They can also be post-coordinated to create on demand the endless variations that LC spends valuable time in creating and controlling.

Another strategy was to enumerate single words found in the LC music headings. The 12,000 headings were systematically broken down into a core vocabulary of approximately 3,000 unique words, without preserving even such bound terms as **MUSICAL INSTRUMENTS** or **VIOLA DA GAMBA**. When used as a lead-in to the printed KWOC index, or this list of terms proved to be an effective means of scrutinizing the terminology available in LCSH. It was possible to note a term's frequency of use, determine its broadness or narrowness of use, and also trace the contexts in which the word appeared.

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Excerpt from Core Vocabulary

pansori
panto
pantomime
pantomimes
papuan
paratum
paredon
parish
parlor
parnasse
parodies
parody
part-song
part-songs

Excerpt from KWOC Index

PART-SONGS

Anglo-Norman part-songs
 use: Part-songs, Anglo-Norman
Arie napolitane (Part-songs)
Canzone napolitane (Part-songs)
 use: Villanelle (Part-songs)
Canzoni alla napolitana (Part-songs)
Catalan part-songs
Clausulae (Part-songs)
English part-songs
 use: Part-songs, English
French part-songs
German part-songs
Latin part-songs

Incorporating Additional Authorities

In addition to studying LCSH, the outlines for music materials presented in the Library of Congress Classification (LCC) schedule and the Dewey Decimal Classification system (DDC) were carefully examined. In a similar fashion to LCSH, these systems approach the discipline of music by combining three basic elements: topics (themes), forms and instruments. Also like LCSH, they intermingle the facets of form (e.g., SONATAS) and instrumentation (e.g., PIANO, VIOLIN). The following outline demonstrates this notion. It is taken from LCC, representing classification number **M219** and is characterized by LC subject headings, **SONATAS (PIANO, VIOLIN)**.

Instrumental Music

Music for two or more solo instruments

Piano and one other instrument

Piano and violin

Original compositions

Special collections and separate works

Sonatas

Studying the classification of music in these major systems, along with the initial analysis of LC music headings, helped formulate the basis of an overall hierarchical structure for the Music Thesaurus. The first design included five basic facets:

forms/genres

sound devices

agents

geo-cultural attributes

other topics (a temporary catch-all)

Sorting the Headings

Once the tentative facets had been identified, the next step in the process was to undertake a thorough sorting — a reclassification — of the 12,000 subject headings. The methodology applied was to assign subject headings to groups, or computer indexes, that reflected concepts described by the basic facets that had been determined.

The ARIS thesaurus software was modified to allow heading groups to be created and manipulated. The software component, nicknamed "ARIS-CoCo," for co-collator, permitted a variety of searching, sorting and collation routines. All headings contained in the various group indexes maintained full links with their original LCSH thesaurus-structure.

Unlike the construction of many thesauri built manually from lists of words written on moveable cards, the Music Thesaurus descriptors were never entirely divorced from an electronic link to the headings in which they were originally found. Even while candidate descriptors were being manipulated, complete access to their place in LCSH was possible. And because the LCSH headings were linked with each other in the online thesaurus display, it was possible to quickly compare descriptors chosen from the Music Thesaurus with the explicit hierarchical contexts in which they appeared in LCSH.

The procedures used proved to be very time-saving. The first rough sorting of the music headings was readily accomplished in less than a month, while the subsequent clean-up of questions took slightly less than another month. To have had to search and examine each individual heading, then either manually type in or copy the heading to a file, would have taken many months to complete this stage of the project.

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Sorting was primarily a process of elimination. The 12,000 headings were collected into groups in several ways:

- (a) individually, by tagging headings as they were encountered in an alphabetical list;
- (b) globally, using string searching in an alphabetical index;
- (c) hierarchically, culling headings with narrower, related or equivalent relationships established in LCSH.

Tagged headings could be sent to alphabetical indexes named for broad concepts represented in the Music Thesaurus. The newly formed group indexes could then be searched and tagged in the same way, extending the co-collation cycle.

Once a group index was established for the single concept represented by a top facet, the group was assessed — decoordinated — to find and enumerate narrower concepts which applied to the same facet.

After narrower concepts were found and evaluated for their suitability, they were expressed as thesaurus descriptors or node labels and added to the appropriate Music Thesaurus hierarchy. The corresponding constituent headings in the group were then collected in new group indexes representing the narrower concept they contained, which now was also part of the Music Thesaurus hierarchy.

It was possible to carry this co-collation cycle out repeatedly. By analyzing the contents of a newly created group, narrower concepts were identified and added to the facet hierarchy. Following this, new group indexes were created which included members corresponding to the newly added thesaurus descriptors. The cycle continued as narrower and narrower hierarchies were produced which corresponded to LCSH concepts.

For example, a set of headings was created and named for the Music Thesaurus facet "Forms/Genres." Every heading found in the 12,000 which corresponded to the concept Forms/Genres was identified and tagged and then added to the Forms/Genres index contained in the ARIS-CoCo.

Next, two indexes of headings were created - named as conceptual subdivisions of Forms/Genres. They were called Instrumental Forms and Vocal Forms. The index Forms/Genre was surveyed and then appropriate headings were sent to the target indexes. Each index created in this fashion was much smaller than the previous index. What began as an index of 12,000 headings dramatically shrank in size with each successive sorting.

As long as the extracted headings exclusively belonged to one facet, the sorting process, because of the shrinking, grew progressively easier. But since many LC headings are multi-faceted, they often belonged to more than one category. It was necessary to sort these headings into indexes for as many facets as they represented. Headings such as **SUITES (RECORDER AND HARPSICHORD)** were sent to the index for Forms/Genres and later to a collocation of headings for the facet Sound Devices.

Headings could be duplicated in as many ARIS-CoCo indexes as necessary. If headings were inadvertently omitted or sent to an inappropriate index, it was possible to make corrections during the process of decoordination, when the vocabulary of constituent headings was closely reviewed.

Creating Vocabulary Resource Sets

As a by-product of sorting, it was possible to store vocabulary found in heading indexes, or alternatively, to key in phrases or words into files called "vocabulary resource sets." Vocabulary in the resource sets was stored as either (1) unique words occurring in the headings, followed by a list of exact heading strings, or (2) exact heading strings. Editing of the sets was also possible. Once a resource set was created, it could be used as a powerful, well-crafted search strategy to interrogate and tag other indexes. Search options available with resource sets included exact, root, substring or word searches. This type of search is somewhat similar in effect to the well-liked MeSH "expand" feature which provides a list of narrower terms found in the Medical Thesaurus hierarchy. The Music Thesaurus-ARIS combination has the added feature of substring searching and users' being able to directly edit the resource set.

An example of a resource set that was created to search for headings qualifying as candidates for the Agents facet was composed of the following substrings: **ists, ers, ians, men, ors**. All headings in the index containing these internal strings were automatically tagged. The results, though not without fault (i.e., loudspeakers, Turkomen, barbershop, instrument), were still quite impressive in precision and recall.

Decoordinating the Headings

After headings had been gathered in a number of indexes representing the original Music Thesaurus facets, it was possible to proceed with the third step: decoordination, a process by which primary, single-concept vocabulary was identified. Two basic methods were used to decoordinate the multi-faceted LC headings. One was to refer to the list of unique words from captured headings produced during the formation of vocabulary resource sets. This core vocabulary was arranged alphabetically with terms appearing without repetition.

The resource set could be quickly scanned and edited to extricate specific terms contained in the headings that were significant to the particular facet being built. The remaining, unrelated vocabulary could be either deleted or saved to be merged with another index or resource set representing a different facet.

Another method used to decoordinate headings was to view printed indexes and resource sets and to compile from them lists of unique and appropriate terms for a specific facet. Particularly for the Forms/Genres facet, this method was not as labor-intensive as might be imagined. There are literally pages of headings containing the term **FOLK SONGS** or **BALLADS** modified by names of language, and pages of **CONCERTOS** and **SONATAS** modified by instruments. Once the form terms were extracted, the remaining qualifying descriptors could be channeled to their appropriate categories.

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Reorganizing the Results

Decoordination of the LC headings provided access to and made possible the reorganization of the many individual terms and modifiers that are embedded in the pre-coordinated LC subject strings. For example, the heading **AFRO-AMERICAN WOMEN COMPOSERS** was factored into several categories:

<u>Concept</u>		<u>Music Thesaurus Facet</u>
Afro-American	=	Geo-cultural Attributes
women	=	Agents
composers	=	Agents

And the heading **SACRED SONGS (HIGH VOICE) WITH CHAMBER ORCHESTRA** was factored into other categories:

<u>Concept</u>		<u>Music Thesaurus Facet</u>
songs (sacred)	=	Forms/genres
high voice	=	Sound devices
chamber orchestra	=	Sound devices

When considered within the broader context of the discipline of music, some headings clearly have meanings/uses beyond those provided in LCSH. The heading **BALLADES (POLYPHONIC CHANSON)** illustrates this point. When this heading was factored (core term: **BALLADES**, qualifier: **(POLYPHONIC CHANSON)**), it was recognized that the core term, **BALLADES**, has at least two common usages in music: (1) a type of song and (2) a piano piece, found in the 19th century. Whereas in LCSH the term is limited to one meaning, a type of song, in the Music Thesaurus, the term will appear once in the Vocal Forms/Genres as **BALLADES (VOCAL)** and once in the Instrumental Forms/Genres as **BALLADES (INSTRUMENTAL)**.

Some LC headings are not multi-faceted, but instead either state or imply multiple concepts. The LC heading **GLEES, CATCHES, ROUNDS, ETC.** contains three separate concepts, or terms. Once factored, each term was individually placed in the Forms/Genres facet.

The syndetic relationship of the heading **GOIGS** implies multiple concepts. The LC record indicates that **GOIGS** is both a *secular* and a *sacred* vocal form/genre, yet only one term is provided:

GOIGS

BT: folk-songs, Catalan

BT: hymns, Spanish

In the Music Thesaurus, the term will appear twice, each entry with a qualifier to distinguish between its two meanings:

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**GOIGS (SACRED)
GOIGS (SECULAR)**

As development of the vocal portion of the Forms/Genres facet proceeded, it was difficult to decide whether headings such as those in the following list belonged strictly to Vocal Forms/Genres:

- A. **WEDDING MUSIC
EVENING-SERVICES MUSIC
HOLY WEEK MUSIC**

- B. **HINDU HYMNS
SUFI CHANTS**

- C. **DIES IRAE
DOXOLOGIES
PSALMS 90**

- D. **MARY, BLESSED VIRGIN, SAINT — SONGS AND MUSIC**

After careful consideration, it seemed that a more appropriate solution might be to leave the headings as bound terms or factor them when necessary, but, in either case, to consider alternative facets for the terms. The result was to create a facet for **Events** (group A.), a subset for **Religions** in the Geo-Cultural Attributes (group B.), a facet for **Texts** (group C.). Because the heading in group D. is a proper noun, and proper nouns are not normally found in thesauri, a firm decision has not been reached about whether to include this term.

Continued exposure to the multiplicity of concepts represented in the LC music headings will allow the thesaurus structure to be expanded into a more logical, specific and inclusive representation of the field of music. At the same time, the multi-disciplinary nature of music will become more apparent. Because language is both modular and universal, the potential — perhaps even necessity — exists for developing thesaurus terms that can be shared, linked, or used in conjunction with other “discipline-specific” thesauri. This is a very exciting possibility and one that deserves further exploration.

The outline, printed below, represents an over-all picture, map or statement of how the discipline of music can, NOT should, be organized. This design is a thumb-nail sketch, based on the vocabulary represented in LC music headings. It represents the beginning of one possible picture. To date, there are seven facets in the Music Thesaurus.

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Agents

musicians

Events

ceremonies*¹
fasts/feasts/festivals*
holidays/seasons*
services*

Forms/genres

instrumental
vocal*
sacred*
secular*

Geo-cultural Attributes

languages*
locations
religions*

Sound devices

instrumental
vocal*

Texts*

sacred*
secular*

Other topics

terms/facets not yet categorized

BENEFITS OF THE MUSIC THESAURUS

It seems only reasonable to ask: once the Music Thesaurus has been fully developed, can it really provide better access to music materials than the 12,000+ LC music headings? At this point, there are more theoretical answers than practical ones. The sorting and decoordination processes applied to LC music headings allow for consistency in both term form and syndetic structure to be established. Single-concept descriptors are placed within a planned, rule-based framework — an outline which can be expanded as new terms are added. The framework provides a context for the understanding and use of a concept. Once a concept is identified, it, alone, can be used as a search strategy or it can be combined with other concepts to create as general or as specific a search strategy as desired.

1. * indicates "in progress."

Members of the Library of Congress Music Subject Group have proposed using terms developed for the Music Thesaurus and, in time, discontinuing use of the precoordinated LC subject headings for musical form and instruments.¹ But because LCSH has been so widely used, it is unlikely that libraries would either update records containing LC headings or totally discontinue use of LCSH in favor of the Music Thesaurus. Therefore, the need to trace the use of terms in both LCSH and the Music Thesaurus is an important concern. To this end, the Music Thesaurus maintains verbal and conceptual ties with LC music headings in several ways. First, its original vocabulary and outline is based on the LC headings. Second, since the foundation of the Music Thesaurus is literally a concept-structured synthesis of LCSH, terms from the Music Thesaurus can be used to perform extremely effective resource set searches (also used in the sorting process) in LCSH. Third, a KWOC concordance of both the Music Thesaurus and the LC music headings converted to thesaurus form are available as a software interface. Search results in the concordance show all instances of a particular word's use in both the Music Thesaurus and LCSH.

Having access to these two related collections of terms in one database has several benefits, particularly for catalogers and library users who may be caught in the transition between the two vocabularies. Both sets of vocabulary will be more accessible and may help supplement each other. The varying contexts or combinations in which a word is used can be noted in either the Music Thesaurus or the LC music headings. Also, the user is able to trace the verbal and conceptual ties between the two lists.

The Music Thesaurus would seem to be well on its way as to incorporating the vocabulary of LC music headings, toward the eventual goal of tracking the entire discipline of music. The question that remains is *how* can it be best used to improve access to music materials? The answers to this question will be revealed as the use of the Music Thesaurus is tested and as its users are monitored.

1. Ken Valdes and others, "Improving Subject Access for Music Materials: a Proposal by the Music Subject Group, Library of Congress, April 28, 1993," *Music Cataloging Bulletin* 24:7, (1993).

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